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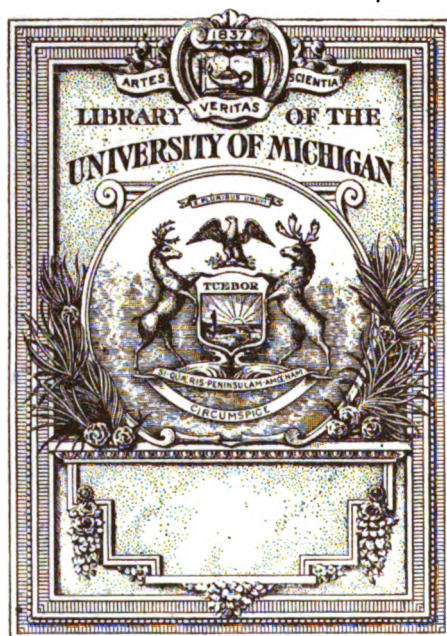
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The American botanist



THE AMERICAN BOTANIST

DEVOTED TO ECONOMIC
AND ECOLOGICAL BOTANY



EDITED BY WILLARD N. CLUTE



Volume IX

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Books Recommended

In this department we shall, from time to time, recommend books that to us seem of special value to readers of this journal.

III.—Fern Books.

It all depends upon what you want the book for. If a technical manual with descriptions of the North American species, get Underwood's "Our Native Ferns" (\$1.08); if a popular handbook for Eastern America select either Parson's "How to Know the Ferns" (\$1.63), Water's "Ferns" (\$3.34) or Clute's "Our Ferns in Their Haunts" (\$2.15). Parson's book is well written but the keys are difficult. Water's book has two technical keys and is illustrated with many photographs. Clute's book has more text than either, has illustrated keys, colored plates and the 225 other illustrations are by an artist of ability. The real fern lover needs all three. Eastman's "New England Ferns" (\$1.25) is a new book that is useful but not so comprehensive as the others, while Dodge's "Ferns and Fern Allies of New England" (50 cts.) is a complete little technical manual. Clute's "Fern Collector's Guide" (50 cts.) tells where to find ferns and how to press, mount and identify them. Useful to take into the field.

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THE SHOWY QUEEN.

(*Cypripedium reginae*)

THE AMERICAN BOTANIST.

VOL. IX.

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No. 1.

HOOSAC VALLEY AND ITS FLOWERS AND FERNs.

BY GRACE GREYLOCK NILES.

ILLUSTRATED BY KATHERINE LEWERS AND THE AUTHOR.

"When my thoughts are sensible of change, I love to see and sit on rocks which I have known, and pry into their moss, and see unchangeableness so established."—THOREAU.

THE closing of the Green and Taconic Mountains about the valley of the Hoosac has thrown together some of the most ancient rock-formations of the world. The peculiar soft portions of the talcoid schists of the latter, averaging two thousand feet in thickness, have created abrupt erosions along the eastern slopes, resulting in deep and picturesque glens. The western sides are more gradual in their approach to the lowlands.

Two ranges of Eolian limestone pass northward through the Valley, uniting near Mount Anthony, Bennington, and extending through the County. The Hoosac Highlands therefore, with their deeply eroded chasms through which laughing rills and roaring cascades reach the deep and peaceful plains, afford rare hiding places for beautiful flowers and graceful ferns.

The western slopes of the Tunnel Range—the "forbidden mountain," separating the Deerfield Valley from the Indian's early hunting grounds of the peaceful "Hoosuck" send down several small streams which irregularly wind through small tamarack and pine swamp areas on their journey to the river.

During May and June the borders of Tunnel Brook are fringed with many beautiful species of early spring flowers. A climb up the mountain reveals the woodman's clearing massed in with trillium, clintonia, dogwood blossoms, jack-in-the-pulpit, dog's tooth lilies, dwarf cornel and

shamrock blossoms. Numerous species of violets delight the collector of rare varieties and conspicuous among these is the sweet Canada violet, nodding half hidden among the tender maiden-hair ferns and showy orchises. Later in May the dainty footsteps of the pink moccasin-flowers (*Cypripedium acaule*) may be traced over the ridges beyond. One may follow the trail of this orchis far summitward to the Central Shaft of the Tunnel Mountain.

Standing upon the bluffs of the Ragged Mountains, across the Valley of the Ashuiticook, one may observe the path leading from the piles of rock near the West Shaft. A line of telegraph poles now ascends the mountain in nearly the same place as the Indians chose to make their trail when raiding the early settlers of the Deerfield Valley. Many granite boulders lie thrown about the slopes,—pitched perhaps by the Giants of Earth, each of which is reputed to have had fifty pair of hands and to have hurled a hundred stones at a single throw! One of these rocks rests near the brook in the ravine east of the West Shaft road. This, however, was doubtless drifted here from Stamford Mountains northward—the only region in the highlands where granite exists. It lies broken in twain,—the larger portion having slipped ahead about four feet beyond the other portion—between which trees now flourish.

A week spent exploring the region about the Hoosac Tunnel Mountain is worth while for the student of Nature and her phenomena as well as for the poet and philosopher who cannot behold the flinty pyramidal piles of rock tunneled from its heart without awe and reverence for the art and science of man which rendered the tunnel possible. Who can tell us how many centuries will roll by ere these monuments of the internal regions will be covered with grasses, flowers and forest trees?

The rolling hills between West Shaft and Aurora's Lake are wild and rugged with out-cropping ledges adorned with briars and low huckleberry bushes, columbine, lilies, common polypody and various other ferns. In

the openings among the pines the sward is carpeted with violets, making the pastures as verdant as those of fabled Ionia.

Westward the path winds through the fragrant pines, until one reaches the pretty mountain lake—so long called Fish Pond. It, having silently pleaded for a more suitable name, was christened Aurora's Lake by the writer in April, 1904.

The swamp-like pockets surrounding this lake are fed by springs and streams which once supplied that early lake of dawn. Above these slowly drained marshes are acres of boggy pasture land, blue with innocence, dog's tooth lilies, iris and shrubs of lamb-kill. Everywhere violets bloom—such violets as only Old Highland Berkshire can boast. Here is a rich field for him who would specialize upon this group of flowers.

In the slowly drained tamarack swamp north of the lake near the Pine Park an unfathomable area exists, where luxuriant piles of sphagnum cover deeply buried stumps and logs. Here the pitcher-plant is at home and is seldom discovered by those wandering along the paths to the park beyond. High huckleberries and shad-bushes offer their blossoms and fruits unseen, and wither unknown to the neighboring cottagers. Along the north edges in the shades of pine the trailing arbutus lingers later than is usual in the woodman's clearing.

A small stream rises in the pastures on the Scully Farm above the lake, along which bluets and a few spring beauties, dog's tooth lilies, dwarf cornel and yellow, blue, white and varigated violets drape the fern fringed borders toward the heart of the swamp. Higher along the hillside clearings beneath the scattered chestnut and birch trees many pink moccasin-flowers and small round-leaved orchises dwell and in the ravines near, the yellow moccasin-flower blooms sparingly.

The swamp is encircled with pine and hemlock which completely hide the wild meadows of the interior from the rude gaze of passers by as they stroll over the hills. One

indeed must be willing to wade through mud and dangerous mires and crawl through entangled vines if he would behold the fair Elysian fields of Great Pan's wonderland! Here the cowslip or marsh marigold and tall blue violets carpet these places ere yet the trees are clothed with tender leaves and soon after, about May 20th, the moccasin-flowers—one species after another—unfurl their dainty petals, conspicuous among which are the pink and large yellow species. A full month later the showy queen (*Cypripedium reginæ*) towers above the ferns and nods content with her own reflections in the sluggish pools bordered round with violets.

Many pipe-like wands of *Habenaria* sway among the sedges—Pan's own pipes indeed—upon which many woodland thrushes perch and sing their songs of June. Meanwhile the Dutchman's breeches and the anemone amid the wee small white violets are fading along the edges of the bog, and in the small hemlocks and spruces the robins are feeding their young and shrilly voicing their fear, and wishing strangers be gone!

The old pine and hemlock logs half buried in the mould crumble beneath our tread and bespeak another age and the dust-bloom of many primeval springs during the centuries since the ancient Lake of Aurora disappeared from these flinty pockets of the Hoosac. Over the wildman's fence along the western edge of the marsh, tangles of willow are sheltered among the pines making the seclusion complete. Beyond these the marsh buttercups, iris and dwarf cornel bloom. On the higher mounds the winter-green vines, clintonia and wild strawberries flourish in peace. Far beyond on the higher ridges of the pastures the hawthorn bushes of genus *Cratægus* are massed with rifts of snowy, fragrant bloom, while bees, butterflies and nesting birds are flitting from bush to bush searching for their own. Nestled in the "hollow vale" at the base of Mount Adams on the north, the "Tunnel City" rears its tall chimney-piles, pouring forth the vile smoke of civilization which creeps over the highland summits to the outer world.

Southward from the brow of Aurora's Lake the Valley of Ashuiticook, the south branch of the Hoosac stretches far beyond the tall spired village of Adams to the giant hills about Cheshire Harbor and beyond. Numerous round glacial hills fill the intervening valley around which the sluggish stream meanders. On the right hand the battlements of Old Greylock's brotherhood rise heavenward. In the nearer woods and pastures a network of swamps lead down the hillsides to the river, where a few spikes of the purple-fringed orchises (*Habenaria psycodes*) bloom in July, and later in the autumn the ladies' tresses, stars-of-Par-nassus, and blue-fringed gentians make a sea waving with gorgeous colors.

Northward along the Mayunsook, the north branch of the Hoosac, one meets chasms where the waters from the Dome have made deep scars in the marble hills. The Natural Bridge along Hudson Brook attracts many tourists each year. This place known to Hawthorne as "The Cave" was a favorite resort for the prose-master during his visit to the Valley in 1838. Many walking ferns cling to the moss-grown ledges about the bridge and following northward along a pretty path leading through a pine forest, one ascends high hills beyond which a beautiful view spreads out on either hand. In the distance toward Stamford a tamarack swamp marks the haunts of the pitcher-plant and many species of *Cypripedium*. A superb view of the Greylock group spreads out towards the south and a sprinkling of boulders is apparent in the pastures everywhere.

One should not leave the head waters of the Hoosac before climbing about the Ragged Mountain and Notch Valley and thence to that lofty brotherhood of Greylock—constituting the State Park Reservation of Massachusetts. On the brow of Ragged Mountain near the city reservoir, a path turns to the left winding over the ridges through swamps which are rich in many early blooms.

The showy orchis especially loves to dwell along these rocky ravines. Above a spring on the right of the path a

little glen leads up among the fern-clad hills where the orchis and a host of hepatica and wind-flowers huddle together with jack-in-the-pulpit and rare spikes of *Habenaria*. Over the distant ridges are swampy pockets where the large yellow moccasin-flowers hide, and near by beneath the spruces the pink moccasin-flowers blossom in select groups. On the hillsides above, the small round-leaved orchis stand as sentinel over all. There is an exquisite delight awaiting the explorer of these hills when he first beholds them.

At this season the ledges and clearings are ablaze with columbine, and masses of swamp apple blossoms (*Azalea nudiflora*).

The Ragged Mountain range consists of three or four prominent saw-tooth peaks and are the foot-hills of Greylock, beginning at the Limekilns near North Adams, where Hawthorne located the scene of his tale *Ethan Brand*, they extend southward to the New England Limekilns in Adams at the base of Greylock. These slopes, as steep as the roof of a house, are adorned with crags and perpendicular bluffs and are seldom if ever ascended, save by the crows and hawks. The tourists and the youths of the City choose the higher summits of Greylock's brotherhood, accessible by the smoother paths and thus the Ragged Mountains are neglected.

The highest peak, more than 2,500 feet above the sea level, was christened Mount Hawks, by Rev. Washington Gladden* in memory of Sergeant John Hawks, who with his twenty-two men held Fort Massachusetts against the fearful forces of the French and Indians. Mr. Everett has called the Hoosac Pass the Thermopylæ of New England. Indeed the verdant meadows at the base of Mount Greylock's brotherhood were scenes of the bravest fights recorded in our history and here have waved the flags of the English, French and Americans in their turn.

This region is the same that influenced and inspired Hawthorne and Thoreau between 1838 and 1846.

*"From the Hub to the Hudson," 1870.

Hawthorne especially loved the seclusion of Notch Valley and the Bellows-Pipe, and often ascended these ragged hills to dream the summer hours away. Many of these "day dreams" together with the voices of the wild are interwoven among the rosy clouds and mountain echoes of his stories of "rough, broken, rugged, headlong Berkshire." It was his custom to ascend the Valley to Mount Hawks and Raven's Crag where, looking far southward; he might behold the giant outline of Monument Mountain immortalized by Bryant and later denominated by himself the "headless sphinx" in "Wonder Book." He usually descended the slopes of the southern Notch Valley to the old quaker Meeting-House and thence to the road near the South Village, where he would meet the Pittsfield and North Adams stage, and Platt "a friend of mine", as he called the driver, gave him a ride to his Whig Tavern in the North Village of Adams.

[TO BE CONCLUDED.]

AIR PLANTS.

BY DR. WILLIAM WHITMAN BAILEY.

JUDGING from questions often addressed to me, I fancy there is much misunderstanding as to what constitutes an air plant. Indeed, some even suppose that there is one plant in particular that bears the name. This is not the fact.

An air plant, speaking botanically, is one that derives its nourishment from the atmosphere. Usually such a plant is attached to some other vegetation, dead or alive, which it merely uses for a support. It may almost as well be perched on rocks, and often is so situated.

Science denominates plants of this habit—"Epiphytes"—that is, vegetables that live upon others. When this is said, however, parasitism is not meant to be implied. That is quite another thing and denotes theft, either open or clandestine.

Air plants are formed in various families, in no other way perhaps, at all related. Thus the orchids, bromeliads,

and even the Ericaceæ, show epiphytic members. The most beautiful epiphytes, without doubt, belong to the Orchidaceæ. Here we only see such in hot-houses. Our native orchids, such as the *Habenarias*, *Cypripediums*, ladies' tresses and tway-blade, are all terrestrial. Among humbler plants the lichens are epiphytic, but a lichen is a dual affair anyway—made up of alga and fungus. If it could speak it might tell us some queer stories of evolution.

But to return to our orchids, the epiphytic forms abound in the tropics—Borneo, Celebes, Java, Sumatra, Madagascar, Mauritius, the South American countries, Mexico, and the West India Islands. Our Phillipine possessions are full of them. Indeed, our colonies—Porto Rico, Guam, Samoa, etc.—offer a grand field for the ambitious explorer.

These orchids often make the forests glorious though the fact remains that tropical woods, as a rule, do not show any such fine masses of color, as we obtain in more temperate regions. The flowers are frequently well up aloft, as are the gorgeous butterflies who love them. They excel in fanciful forms and wealth, or even exaggeration, of color. Often they resemble insects or the smaller birds; we have seen pictures of some that looked for all the world like little imps. There is no harmony or contrast of color that they do not exhibit. Homely looking plants, often, and springing from spindle-shaped and ribbed pseudo-bulbs, all at once they burst forth into extravagant blossom. The flower of the Holy Ghost is an orchid. In it the true believer beholds the Spirit in the form of a dove descending to comfort and console. It was in Madagascar that Ellis found the strange *Angræcum sesquipedale*, with a nectar-bearing tube nearly a foot long. When discovered entomologists foretold the existence of a moth with a proboscis equally long to fathom it. The accommodating insect soon after turned up. He had to; the two things were correlated!

One who has never visited a large conservatory filled with these exquisite plants, can give no idea of their

transcendent beauty. Next to seeing the plants themselves, and every one who gets a chance should do so, the best thing is to consult the elegant plates in Bateman, Hooker, and some other of the great writers on orchids.

The bromeliads or plants of the pine-apple family are only second in beauty to the orchids. Our sole American representative, except in Florida and the Gulf States, is the so-called "long" or "Spanish moss," *Tillandsia usneoides*. This is a good instance of an epiphyte—but not a representative of the beauty of its really fine family.

According to Hooker, in the Himalayas certain rhododendrons assume an epiphytic habit. This shows that the trick is due more to environment and circumstance than to any degree of relationship.

Brown University, Providence, R. I.

THE RISE AND FALL OF THE TUMBLEWEEDS.

BY WALTER ALBION SQUIRES.

FOR the early settlers of our prairie states, the name "tumbleweed" will need no explanation. During the years when the prairies were being settled and brought under cultivation these weeds formed one of the characteristic features of the plains. One of my earliest recollections is that of standing at a window watching the tumbleweeds as the strong north winds, sweeping over the brown grass as only a prairie wind can blow, drove them along the distant stretches of the prairies. In those days there were few obstacles to obstruct their course, and as soon as the strong autumnal winds began to blow, collecting in unnumbered thousands from miles and miles of newly broken sod, they began their rolling, tumbling flight.

The tumbleweeds (*Amarantus albus* and *A. blitoides*) are doubtless indigenous to our Western States, and as introduced weeds they are probably to be found in every State of the Union, but they are nowhere so abundant as they once were and in many of the Prairie States where they were once the predominant weed they have sunk to a

position of comparative insignificance. What were the causes which led to their sudden rise to a position of prominence and as sudden decline we may not be able to tell. We can only point out a few of the probable factors. Being annuals and requiring plenty of room to grow they were easily kept down and all but crowded out of their prairie homes by other and hardier plants. They must grow and reproduce their kind as best they can under the relentless sway of the world wide domination of the grass family. Where passing hoofs had trampled out the sod or some burrowing animal had thrown out a mound of earth they found root and grew for a season or two till the grass came back to reclaim its own.

Through ages of this "struggle for existence" they doubtless developed their rolling habit and came to produce a great number of seeds—seeds of such a remarkable vitality that they could lay ungerminated for years and bide their time. The result was that when the revolution wrought by the breaking plow came to the prairies the tumbleweeds of all the prairie plants were best fitted to profit by the overthrow of the grass dynasty. Seeds which had lain for years among the grass roots sprang up and grew into plants of unprecedented size. The soddy surface rich with decaying grass roots seemed exactly suited to their needs and there was room in plenty.

Like barbarian hordes seeking new homes in a crumbling Roman Empire these weeds began to push out into places where they had never grown before. In vast wind-driven armies they began to push out to all points of the compass, each year widening the area of their realm as though they had dreamed of universal dominion. Crossing the Mississippi they encircled the Great Lakes, climbed the slopes of the Appalachians and reached the Atlantic sea board.

But ere they reached the sea they had plainly had their day. The older soil seemed less suited to them and they did not endure cultivation well. Besides they now no longer had things all their own way. In the Eastern

States they met a westward-moving horde of introduced weeds,—weeds so hardened by centuries of struggle against man's dominion that the tumbleweeds stood little show of gaining a permanent foothold among them.

Even on the plains the tumbleweeds no longer have the chance they once had. There are few places where extensive breaking of the native sod is now being done. Even where it is still being carried on the sod is much more frequently prepared for a crop the first year than formerly, and though it be left vacant the tumbleweeds must fight for a foothold with many varieties of introduced weeds. Where they once swept for miles over the plains they are now almost certain to make only a pitiful little run of a hundred yards or so only to be brought up by a hedge row, fence, grove, or cornfield, there in an uncongenial spot to drop those thousands of seeds intended to be scattered afar across the prairies.

There are probably only a few of the ecological factors which have influenced the rise and fall of the tumbleweeds. Plant species like men and nations have their periods of development, their little day of power, and then their swift decline. Ferns, scouring rushes and club-mosses grow in bogs and swamps in dark and shady places and in crevices of naked rocks, and yet their ancestors once dominated and clothed with thick forest large areas of the earth's surface. Could we but tell the whole of the life story of these plants or even the complete story of the humble tumbleweeds, might it not rival in interest and wonder the story of the rise and fall of Persia, Thebes or Macedon?

Kooskia, Idaho.

SOME PLANT MYTHS.

Superstition is about the last thing the human animal gets out of his system in progressing from ignorance to enlightenment. Although he may discard its grosser forms, he continues to cling to a belief in charms, signs and miracles and gives them up unwillingly. The thriving business

that is still being carried on by astrologers and other fortune-tellers, dealers in dip-needles for finding treasure, and workers of various other games that depend for their success upon a credulous public, are proofs of this assertion. The realms of Nature have always furnished the monger of sensations with a free field for the play of his imagination. From excursions into these regions he has returned with the sea-serpent, the unicorn, the roc, the barnacle-geese that grows on trees, the man-eating tree, the upas tree and a vast number of other equally entertaining and untruthful creations. One after another science has killed these off, but "newspaper science," the product of fledgeling reporters who would not know true science if they met it squarely in the way, is ever ready with new and equally wonderful stories to tickle our credulity. Nature is full of wonders, but the wonders of the reporter's imagination so far outstrip the wonders of nature, that as a people, we still prefer the reporter's version. The best selling popular science is that in which animals think, act and often talk, exactly like human beings, and in which plants are endowed with instincts that properly belong to animals alone. Instances are so abundant in the lay press that scientific publications no longer take notice of them, but when a publication devoted to science publishes such stories for the truth, it is time someone pointed out their falsity. From the February number of *Floral Life*, a continuation of *Meehan's Monthly*, we clip the following:

DISCOVERING AN IRRIGATING ORCHID.

"Mr. Suverkrop, a naturalist, who has made many journeys in South America to enrich the Kew Gardens, near London, with new plants, reports the discovery of a remarkable plant belonging to the orchid family. The naturalist tells this story of his discovery: I was sitting one hot afternoon on the shore of a large lagoon in the neighborhood of the Rio de la Plata. I observed a number of leafless trees whose life had evidently been nearly absorbed by the growth of parasitic plants that

hung upon their trunks. My attention was soon directed to a flat plant with a number of large leaves, in form like spear heads, arranged like a sunburst around the center. It was a plant I had never seen before.

It was nearly as flat as a platter, except that there was a growth from the center, a sort of hollow tube of small circumference which extended several feet to the water below, the end of the tube being about four inches beneath the surface. I investigated the tube more closely and found to my surprise that it was sucking up water! I could distinctly feel the inflow as I put my finger over the mouth of the tube. But my astonishment was unbounded a minute later when I saw the tube begin to roll up, the process continuing until the coil thus formed had reached the middle of the plant, where it came to rest."

This note has appeared in many newspapers, and has been sent to us for verification. Of course, no botanist needs to be told that no such plant exists. In the May number *Floral Life* follows this story with several others as wonderful, from which we select some of the best.

THE NERVES OF PLANTS.

"According to an expert in the Botanic Gardens at Washington, recent experiments there tend to confirm the theory that plants are possessed of nerves, and that some species are irritable and nervous to a marked degree. The genus *Mimosa* comprises about two hundred species, and most of these exhibit peculiarly irritable natures if touched or handled in the wrong way. The *Mimosa pudica*, the botanical name of the most sensitive of all plants, is so highly organized that it is kept in a state of neurasthenia most of the time. A puff of wind, the tramping of heavy feet near it, or a rude touch of the hand will cause this plant literally to go into nervous hysterics. It appears that the exciting noise or commotion strikes the nerves of the plant and causes it to close up and droop its leaves. Hundreds of sensitive plants have been diagnosed in the Botanic gardens, and the observers of the plants have traced the nerve centers to their foundation. In certain of

the plants the ends of the nerves have been located. Thus if *Mimosa pudica* is touched with ever so fine a point at the base of a pinna or along its axis, the most remote pair of leaves will shiver and begin to close. Finally, when all the leaves have closed, the pinna which has been touched will droop. The shock has been so great that the whole nervous system has been temporarily disarranged. However, like all nervous, irritable people, there is a point beyond which fright reacts and a control of the system begins to manifest itself. If the sensitive plant is shaken for some time it recovers from its attack of neurasthenia and some of the leaves will begin to open again. Finally, it is said that the most sensitive part of the plant is at the base of the secondary leaf stalks, where an immense number of nervous corpuscles or delicate tissues are located."

This case is surely one of neurasthenia, but to us it appears that the "nervous hysterics" have been charged up to the plant when they really should have been attributed to the "expert." Certainly "nerve" if not nerves is required to provide such an article.

A COUGHING PLANT.

"An interesting vine known as the coughing bean, is a respiratory plant which is a native of moist, tropical regions. By accidental transportation of its seeds it has gradually spread to much less congenial spots, especially railroad embankments, where it endures drought very well, though its growth is stunted. But there is one thing it cannot endure, and that is dust. When the breathing pores become choked by dust the gases accumulate within the leaf for a time and then are forcibly ejected in an audible paroxysm of coughing and sneezing, which makes the leaf tremble violently. At the same time the whole plant becomes red, owing to the subsiding of the green chlorophyll grains and the appearance of particles of red coloring matter on the surface. This odd vine is sometimes cultivated as a house plant. Sweeping the carpet of the room in which it lives is very apt to set the plant to

coughing, much to the astonishment of persons unfamiliar with its peculiarities."

We would modestly suggest that that botanic garden "expert" be sent a specimen of this wonderful coughing plant. No doubt he could easily contrive a cough mixture that would cure it. Meanwhile, owners of the plant who find it getting red with prolonged coughing are neglecting their duty if they do not slap it on the back or tender it a cough-drop. If the "expert" has any decency about him, he will not attempt to treat this plant in the same house with the sensitive plant. Think what a case of "nerves" would be developed. No really sensitive plant could think of occupying the same bench with a stranger that is in the habit of coughing until it becomes red all over.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items.

MORE EXTINCT SPECIES.—In these days when any systematic botanist is inclined to stretch a point in order to include a new species in his list, it is refreshing to take up a publication like that of Dr. J. W. Blankinship's on the Flora of Montana in which the author has the good sense to see that no good can come from describing new species that do not exist. Although he is State Botanist of Montana he has deliberately disclaimed nearly a hundred species credited to the State by recent writers. Some are excluded because out of their known range, others because wrongly determined, and still others because in the opinion of the author they are mere forms of better known species. The systematic botany of the West seems to have become very much *Rafinesquesque* in the past few years.

THE DESCRIPTIONS OF FLOWERS.—One has only to consult the nearest manual to discover that the color-scheme of flowers is rarely described with exactness. The colors present are usually fairly well indicated but their arrangement and extent are but loosely described. Those who discover errors of this kind should make them known.

PÆONY OR PEONY.--The proper spelling of the genus to which this popular flower belongs is *Pæonia*. In our grandmother's day the common name of the plant was pronounced as if spelled pi-o-ny and by the uncultured this was soon corrupted to piny. Now-a-days we hear the plant spoken of as the "pe-o-ny" a most unwarranted perversion of the name. The diphthong æ in Latin is pronounced nearer the English i than any other and since the common name was derived from the scientific, those old-fashioned folks who continue to speak of the piony are really nearer the mark than their critics who insist upon peony.

THE ROOT-TUBERCLE BACTERIA.—According to recent reports the bacteria that form tubercles on the roots of leguminous plants, from which the plants later are able to derive nitrogen, appear to belong to a single species named *Pseudomonas radiculicola*. It is known, however, that certain species of legumes will not grow in soils from which their favorite bacteria are missing. For instance, alfalfa will not grow in soil that has only the clover bacteria, though it will grow in soils in which the sweet clover (*Melilotus*) bacteria are found. This peculiarity is explained by the statement that while there is only one species there are several distinct forms or races. It is also said that the slight differences between these races may be broken down by cultivation. Contrary to the opinion first held, it is now believed that the association between leguminous plants and bacteria is not a case of symbiosis, but that the bacteria are rather in the nature of parasites. They are of benefit to the plants, however, in that by the death and decay of their bodies, the plant is able to obtain nitrogen.

A WATER-STORING PLANT.—The various species of cactus and many other fleshy or succulent plants store up more or less water in their tissues for use in dry seasons. A plant from the island of Guam, mentioned by W. E. Safford, seems to have solved the same problem in another way. This plant is an epiphyte and is known as *Dischidia puberula*. Some of its fleshy leaves are modified into urn-like receptacles. These usually contain water and the adventitious roots from the stem often creep into them as if for nourishment or moisture. The water is probably not stored up for this purpose, but those who see adaptations in everything will doubtless make a very pretty story out of these facts.

DO SPECIES DIE OF OLD AGE.—Individual plants as well as animals have their periods of youth, maturity and old age and when the destructive forces at length tear down the organism faster than it can be built up, death ensues. Species being mere aggregations of individuals might seem, at first glance, to follow the same rule, but this is by no means proven although evidence that they do so has been offered. That the answer to this question has a very practical bearing upon every day life may be seen in the case of the potato. Recently British growers of the potato have raised the cry that many of the principal varieties are dying out. If this is true, some other food plant will have to be selected to take its place. According to the new origin of species, evolution is constantly going on and new species originating. In this event there would come a time, theoretically, when any species may have to give way to a stronger one. We are all able to recall species that appear to be dying out, and this appears to be due to gradual changes in its surroundings, but when man cultivates a species and protects it from its enemies there appears to be no reason why it should ever die out.

Editorial.

During the summer vacation the editor spends part of his time at Binghamton putting things in order for another year's publications. If any subscriber has not received his due during the past year, he wishes to make it right. If your file of the magazine lacks any numbers, now is the time to let us know; they will be sent free. It is impossible for us to see every copy sent out and if by chance you have received spoiled or soiled copies we want to replace them. Our interest extends further than the mere sending of a dozen numbers for a dollar. The great bulk of our subscribers have full sets. Many of them have helped make the magazine, by articles, notes and suggestions by letter, so that it is about as much our subscribers' magazine as it is our own. This is why we want them to have clean and complete sets. Very soon these first volumes will be no longer obtainable and then they will find themselves in possession of something that will grow more desirable with each year.

* * *

Indexes to the first four volumes of this journal have now been issued and will be mailed free to all owners of these volumes upon request. The other indexes will be issued as fast as possible. It is our intention to issue an index to the volume just completed, some time this summer and in the future to index the volumes as completed so that no time may be lost in binding. We are glad to note that a large number of our subscribers are binding their copies. This is a good idea, for the vast amount of facts about plants that they contain will make them as valuable as an encyclopedia for all time.

* * *

According to the newspapers the Cornell forestry case has just been decided against that institution. In 1898 the New York Legislature appropriated \$500,000 for the purpose of conducting experiments in forestry under the

supervision of Cornell University. It is charged that the University at once purchased thirty thousand acres of forest in the Adirondacks and began cutting the timber from it. Most people understand forestry to mean conservation and not destruction of the forests and a protest by those interested in preserving the Adirondack forests resulted. It is alleged that the University was induced to lumber the tract by a forestry expert to the end that a new forest might be planted. It is just such "expert" advice that brings scientific knowledge into disrepute. It will not go down with the hard-headed practical people that form the bulk of every community. No matter how wise in book-lore a man may be if he does not supplement his learning with common sense he cannot expect to gain the confidence of the public.

* * *

Within the past few months there has been a tendency among the big magazines to increase their price. Several of the dollar magazines now charge for single copies at the rate of nearly two dollars a year. This will certainly result in greater popularity for the small scientific magazines. At present it is nearly impossible to convince the ordinary botanical reader that he is not paying too much for his scientific reading. He compares the number of pages with the number in the big magazines as if mere number is everything, and utterly overlooks the fact that twenty-four pages of one may give more information of the kind he wants than a thousand of the other. A rise in price by the big magazines must draw attention to the actual cheapness of the others.

BOOKS AND WRITERS.

"Ferns and How to Grow Them" is the title of a volume in preparation by Doubleday, Page & Co. The same company have recently issued "Our Native Orchids" by William Hamilton Gibson and Helena Leeming Jelliffe. This is said to be based upon an unpublished work left by Gibson at his death.

The Gardening World, of London, England, has added several new headings to its columns and in other ways brought its typographical appearance up to date. Its contents need no such improvement. We consider it one of the best and most practical gardening publications that reach us from "the other side."

The Montana Agricultural College has established a publication known as "Science Studies." The first three numbers have to do with the flora of the State. In the third number an alphabetical list of the common names of Montana plants is given, followed by a similar list of scientific names with the common names added.

Doubleday, Page & Co. have recently launched the "Nature Club of America," and hope to establish branches throughout the country. The society is apparently designed as a "feeder" for the set of nature books issued by this firm but the programs for the study of plants and animals are free to all who apply and will doubtless interest all who are attracted to Nature.

W. S. Blatchley, State Geologist of Indiana, has sent us a copy of "A Nature-Wooing," issued some years ago, in which he recounts his adventures in the field during a winter spent in Florida. Mr. Blatchley is an accurate observer and a pleasing writer and his book is well worth a reading, especially by those who will visit or have visited the part of the world of which it treats.

The success of Dr. A. J. Grout's "Mosses with a Hand-lens" has led him to put out a second edition to which has been added the common hepatics or liverworts. Without doubt this is the best book for the beginner in the bryophytes ever issued in America. The characters by which the species can be identified are, as the title of the book indicates, such as may be made out with a simple lens. The liverworts have now been treated in the same manner. The book abounds in good illustrations which supplement an excellent text carefully and lucidly written. (New York, The O. T. Louis Co., \$1.75.)

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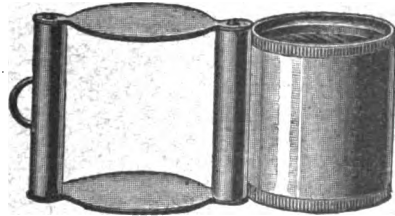
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VOL. 9.

AUGUST, 1905.

NO. 2.

THE AMERICAN BOTANIST.

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Books Recommended

In this department we shall, from time to time, recommend books that to us seem of special value to readers of this journal.

IV.—Fern Pamphlets.

There is a good deal of literature relating to ferns that is bound in pamphlet form. Students of the fernworks should have the following: "Papers presented at the Boston Fern Meeting (by Davenport, Grout, Fleming, Clute, Gilbert, Eaton and Britton) 25 cents. "Fernwort Papers" (by Eaton, Underwood, Slosson, Gilbert and Maxon). 25 cents. In these two pamphlets are to be found descriptions of several new species and many notes on rare fernworks. "Ferns of Nicaragua" 50 cents, the only publication on the ferns of this region. Gilbert's "North American Pteridophytes" 25 cents, is a list of the ferns and fern allies of North America. Clute's "Ferns of the Upper Susquehanna" 10 cents, is a list of species with notes. "The Index to first ten volumes of The Fern Bulletin," 25 cents, contains several thousand references to ferns and fern allies. We will send a set of the above for \$1.25. Some numbers are becoming scarce, order now.

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(*Habenaria psycodes*.)

THE AMERICAN BOTANIST.

VOL. IX.

BINGHAMTON, N. Y., AUGUST, 1905.

No. 2.

HOOSAC VALLEY AND ITS FLOWERS AND FERNS.

BY GRACE GREYLOCK NILES.

ILLUSTRATED BY KATHERINE LEWERS AND THE AUTHOR.

[CONCLUDED.]

ONE does not climb to the summit of Greylock to gather flowers, but rather as the philosopher Thoreau,* who restored his mind with memory scenes of grandeur and beauty. He says: "For I had come up here not for sympathy; or kindness, or society, but for novelty and adventure, and to see what nature had produced here." He speaks of the path up the spacious valley of the Bellows and continues that: "It seemed a road for the pilgrim to enter upon who would climb to the gates of Heaven."

It is not possible to wander with ease through the pathless forest of this primeval brotherhood of peaks, and old bruin and his mates are forced to follow beaten trails through Wilbur's Park, to the Inner Hopper region and Bald Mountain beyond. I cannot imagine a more pleasurable or instructive holiday than a month spent exploring the deep recesses of the Greylock group, during June and July. A study of the alpine blossoms compared with the flowers of the lowlands, might suggest more poetry and philosophy than is commonly suspected.

There are several approaches to the summit of Greylock and one should become familiar with all these trails in order to fully appreciate the grandeur of the mountains.

* H. D. Thoreau, *Tuesday*, "Week on the Concord and the Merrimac Rivers."

which extend six miles from east to west. An ascent by way of the Cheshire Harbor trail is the most gradual, yet at best it is a tedious, weary, meandering path to be traveled before one arrives at the Divide, and the Lanesboro-Pittsfield Road, a mile from the summit. No one should leave the great hill until he has dipped down into the fearful abyss of the Hopper and the inner heart of Greylock. It would be wise to pitch a tent on the Alpine Club's camping ground about the wild grassy meadows of Bald Mountain, and leisurely explore the Cascades of Money Brook as they leap toward the deep chasm of the Hopper.

From whatever source of Nature the mind may derive its store of beautiful scenes and happy memories the supply is sufficient for all time, and life cannot seem a failure to him who comrades with the mountains and listens to their inspiring voices. He who has rested upon the brow of Bald Mountain can still hear in memory the distant soft rushings and louder gushings of the Cascades as from the shaggy brows of Greylock they leap down—down into the heart of the abyss, a thousand feet below at the giant's base.

The Hopper region is girded with rugged heights, appearing much like a miller's hopper. Soon now the early morning mists dissolve from the brotherhood, and the sun beams over the shoulders of Mounts Williams, Fitch and Greylock, and kisses the bold forms of Prospect and Bald Mountains. The whole world seems beautiful in its new birth as the distant blue peaks of the Green and White Mountains roll off, one wave after the other like mist-billows on an atmospheric sea!

There is a trail of easy gradation leading from the College town of Williamstown through the Hopper. It winds around the north slope of Bald Mountain through deep shades of spruce and finally leads to the wild meadows at the base of Greylock near the camp grounds of the Alpine Club. Keeping to the left corner of this field one finds a path leading slightly to the right for a quarter

of a mile to the Lanesboro-Pittsfield Road and thence two miles more to the summit. At the junction of the paths at the Divide, the roads branch from either hand and encircle the crown of Greylock. It does not make much difference which path one takes from this point except that the right hand road, which is walled about, affords the more extensive view. Along this road one meets signs pointing to the path to The Slide. This is not an easy descent as the stairs are steep and of unusual height and there is no rail to aid one in the climb. Many students, however, make the ascent by way of this trail. Nature herself set this path by means of a cloud burst that began near the summit widening as it loosened the soil from the bed-rock in its rapid descent to the valley, covering the farms in the vicinity with troublesome rock and logs. Farther on a path turns off to the right leading down to Bellows-Pipe coming out on the very ridge of pastureland in the extreme portion of Notch Valley. This is the trail beloved by Thoreau, which he took when leaving the Wilbur Farm on his route to Greylock.

The North Adams Road is the most gradual of descent of all the drives to Greylock Park and winds adown the brow of Mount Fitch above the inner heart of Greylock, until it passes through dense forests of black spruce to the clearings of Wilbur Park where a trail may be found which leads westward to the highest peak of Mount Prospect. President Hitchcock once said of this prospect "We came to the steep margin of the mountain, and in a moment the beautiful valley and village of Williamstown burst like a bright vision upon the eye. . . . I have rarely, if ever experienced such a pleasing change from the emotion of beauty to that of sublimity as at this spot."

Continuing the descent one winds around the base of Mount Williams through the pastures to Walden's farm—and for him who walks it is most direct to the City—following near the borders of Notch Brook, through Snuff Hollow or Crow's Nest. This stream, however, soon

enters deep ravines where numerous cascades play over great ledges down to the Hoosac. The chasm is very irregular and overhanging the banks, a great profusion of common polypody ferns cling together with frequent plants of maiden-hair spleenwort and walking ferns. Leaving the Highlands by way of this stream one follows the river northward through broad terraced meadows on the Harrison flats near the site of old Fort Massachusetts. The serpentine windings of these peaceful waters add impetus to the current.

The terraces of that ancient Lake of Aurora are still discernible everywhere about the valley and as the stream approaches the narrow pass just beyond the State Line it crowds hard against the rocky hillsides, scarcely leaving a safe passage for the roadway.

An interesting ledge of rock is formed along the Dug-Away at this place, known locally as the "Weeping Rocks." They consist of enormous shelving, pudding-stones covered with moss hanging in the form of stalactites, from which water trickles. These rocks are of calciferous, conglomerate and sandstone formation, and the cement or calcareous matter is being constantly derived from the slowly flowing water from these limestone hills. This cements together the small boulders and sandstone in such a manner as to amass enormous rocks that dynamite has little power over, since no drill could be used advantageously to blast them.

An Indian legend is associated with these "Weeping Rocks." In this region a powerful tribe of Indians once sought refuge from the persecution of their enemies. Among them had been handed down a tradition that they should never be totally conquered and would endure till *the rocks wept*. Upon observing these rocks, however, terror and apparent fulfilment of the fatal prediction overwhelmed them with despair. A son of Williams College early commemorates the legend in part:*

* Williams Quarterly.

“Yet never they raised an impious hand,
The fates had spoken—their word must stand—
Here mourn the rocks a Nation’s woe,
And tear-drops from the mountain flow.

Silent they fall at their chieftain’s side,
And Hoosac blushed with the purple tide
Not a groan was heard, not a tear was shed,
But the rocks bewailed a Nation’s dead.”

Rattlesnake Brook, a picturesque stream rising in a decadent pine and hemlock swamp on Mount Ceta, above the “Weeping Rocks” of Dug-Away, meets the river near the State Line. Many rare flowers dwell among the hills and vales in this region. The grandest pastoral views of the Highlands are visible from our modern Mount Ceta, especially in the early morning when the valley about Williamstown is filled with billowy seas of mist which strangely suggest those ancient lakes of Aurora as they rippled to the Hudson.

The valley about Pownal is much like a deep secluded glen, surrounded on all sides by rolling hills and ledges which would be creditable mountains if there were not higher summits of the Taconics looming beyond them. The Bogs of Etchowog lying at the base of the Dome in the eastern part of the town extend toward Bennington—a distance of six miles. The floor of this swamp area is fed by sluggish streams meandering through a chain of decadent lakes, now being overgrown with sphagnum, in which cranberry vines, Labrador tea, small tamarack, pitcher-plants, various orchids, lilies and marsh plants flourish.

The purple-fringed orchises choose for their habitat the wild meadows bordering mountain lakes, or shady margins of sluggish streams. These orchids are among the most fragrant and beautiful *Habenarias*, although one may search long before he discovers their secret homes. In many places the mountain laurel is embanked against the mountainsides and flaunts the most gorgeous colors

imaginable. That Americans do not cultivate these flowering shrubs instead of the foreign species is inexplicable.

One more marsh—the Swamp of Oracles claims notice before descending again to the deeper valley. It is in this region that all of our New England *Cypripediums* bloom. From about the 15th to the 25th of May the rare ram's-head moccasin-flower of this genus unfolds its dainty dull purple slippers under the pines along the rocky borders of the swamp. This is the most southern station reported for Vermont, and is at this date the only town in the Hoosac Valley where this *Cypripedium* dwells. The most southern station for this species existing in New England is Mount Toby in Massachusetts.

Eastward in the marsh the pink moccasin-flower and her two yellow sisters—*Cypripedium hirsutum* and *Cypripedium parviflorum*—are unlacing their golden shoes. Later the showy queen (*Cypripedium reginæ*) is abundant in many swamp areas in the region, though it is freely collected by school children and lovers of Nature. The haunts of our flowers and ferns should be known in order that their beauty be appreciated, yet a public conscience should be created and exercised in their protection.

The rarer ferns of the Hoosac climb over the dangerous Gregor Rocks east of the village of North Pownal. These bluffs of limestone are probably the remaining portion of a ledge which at one time spanned the valley. Their summits reveal scars of great volumes of water eroding them from the east, doubtless the overflow of the large Lake of Aurora which was located between Mount Anthony and the Dome.

The first settlements in the valley were made by the Dutch in 1724. No record of them remain save the names of the places which they occupied. Gregor Rocks were owned by Gregor who settled a little north of these cliffs. His wife was considered extraordinarily intelligent by her neighbors and for this reason was accused and tried as a witch.

These marble bluffs are festooned with ferns, and no

one can pass through the town without beholding with wonder the great cliffs towering above the narrow valley. One must encounter many difficulties before he beholds the rare flowers and ferns of these hills and yet the view is sufficient to repay one for the climb. The hills are clothed with cedars, oaks, birch and various other trees, and if one carefully observes the crevices of the boulders he will find the rarest of our ferns—the rue-in-the-wall and its comrade, the purple-stemmed cliff-brake—clinging in these fissures. In 1578 the rue-in-the-wall was known to grow on moist old cathedral walls in England and Germany. These ferns do not resemble the ordinary species, familiar to country folk and few recognize them as members of the Fern Family. The walking ferns also dwell along the bluffs and are abundant along Wash-Tub Brook and Pownal Centre Road.

On the brow of Gregor Rocks the snowberry (*Symphoricarpus racemosus*) grows, and in the autumn is laden with bright white berries. This is the only station known to the writer for these shrubs. They belong to the Southern and Western States, and this haunt is worth noting. A station has also been reported for these species on similar limerock bluffs on Mallett's Head, Isle La Motte in Colchester, Lake Champlain region. Stray plants of the coral-root (*Corallorhiza*) also grow along the cow paths leading over the rocks, and the blue bells of New England everywhere adorn the ledges and open pastures among the cedars.

Nabbie's Leap is located at a point on the very brow of the rocks where a foolish girl named Nabbie Ross made a dangerous leap and was caught in the top of a cedar tree and thus buoyed up until the villagers with the aid of ropes came and lowered her safely to the bottom of the cliff, a distance of nearly ninety feet.

During August and September the red wood lily towers along the roadside hedges and borders the open woodland clearings. The autumn days march on with a wealth of golden-rod and asters, banked among the crimson sumac

and pearly everlasting which breathes out a delicious fragrance. About the Bogs of Etchowog beyond Gregor Rock the ladies' tresses, the last orchid of the year, blooms amid the blue-fringed gentians, and creamy stars-of-par-nassus, making the marsh a place of marvelous beauty.

THE PITCHER-PLANT INDOORS.

BY WALTER ALBION SQUIRES.

IT is probably not generally known that the pitcher plant (*Sarracenia purpurea*) can easily be raised indoors. Over a year ago I secured one of these plants from an eastern nursery. I planted it in a small pail, in a soil composed of sand mixed with the sphagnum moss in which it was packed when it came from the nursery. I had heard that they should be grown under a bell-glass, but not having anything of that kind, I placed a lantern globe over the plant. It began to grow at once and kept sending up new leaves all summer. These were mere sharp pointed cylindrical shoots at first, but before they were an inch long the well known pitcher form began to make itself manifest. A small notch appeared on the dorsal side near the tip of the shoot. This was finally to become the opening of the pitcher just below the hood. The leaves remained closed until they were nearly full-grown; the two sides of the hood being pressed close together. Then some morning on looking at the plant the leaf would be found wide open. Around the under side of the hood were many sharp pointed bristles all pointing downward; below these was a zone as smooth as glass, and the bottom of the pitcher was full of water; a veritable death trap for the flies and other small insects which came to taste the drops of clear nectar-like fluid which was sprinkled over the inner face of the hood. Many were the victims which went down over that smooth surface never to return.

Although our plant did not produce any flowers, it is safe to say that it attracted more attention than all the

other house-plants together. After midsummer I placed it out of doors. It endured much neglect with dry and windy weather but kept on producing leaves all summer. It was placed in the cellar over winter and when taken out this spring began to grow as thriftily as ever.

The pitcher plants are among the most remarkable plants that our country produces. There seems to be no reason why they should not be often seen in the home collection and their presence in the school room would certainly lead to greatly increased interest and pleasure in the study of plant life.

Kooskia, Idaho.

A VISITING TEMPLAR.

BY DR. WILLIAM WHITMAN BAILEY.

A BEE flew in at my window laden with the sweets of summer. His costume was elegant and of a mediæval style. He wore a black velvet doublet, slashed with yellow, and altogether was a dignified traveller. He seemed bewildered in my apartment. After a while, becoming more familiar, he began an exploring tour. He looked into the vases and the water jars, he bumped his head against the mirror in vain attempt to perforate it; he read the title of my books, and narrowly escaped drowning in the wash-basin. When he came too near my head I remonstrated, and, like *Rhoecus*, drove him off. He carried consternation to the heart of the flies which were wheeling in the centre of the room. It was like the intrusion of a comet into their peaceful planetary system. When quite fatigued with his journeys, he would settle down in a remote corner and buzz like a hurdy-gurdy. He can tell a curious tale when he flits back to the woods.

I should like to know where he last came from, and how he happened in the depth of the City. Here we have no clover tops for him to dip into, no columbines upon which he can swing. A melancholy fuchsia in the window or a struggling geranium devoid of honey, is all that we give our visitor. From his costume, he is a Knight

Templar, but there are no brother Knights to welcome him. Did the little stranger live in the forest, sweet with birch and fern, or did he bore a hole beneath the seat of some portico to astonish or alarm the sitters?

Wherever he came from, this Mr. Bumble, it does one good to greet him. He brings in the perfume of the meadow flowers. I seem to see the broad fields of glowing buttercups, "the little children's dower," the daisies nodding their starry heads, and the dandelions offering their golden disks. I should like to have the fellow stay, but no, he must be off.

The persistent husbandman lays up in summer a surplus treasure for the rainy day. Old Bumble does the same. He thinks of the long winter, of the snows and storms, and must not loiter here. With a final whirr—which seems to affirm a new resolution—he dives through the open window and is lost in the blue of Heaven.

Brown University, Providence, R. I.

THE PARTRIDGE PEA.

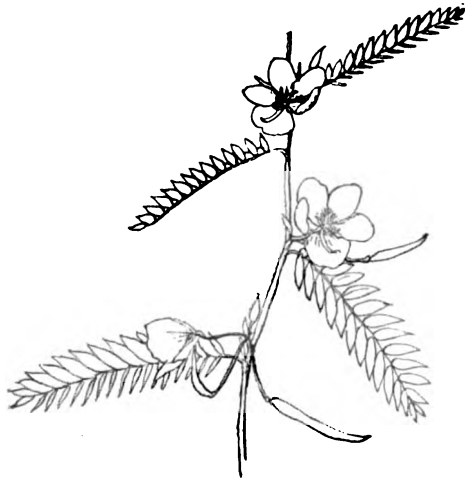
BY WILLARD N. CLUTE.

ONE of the commonest weeds in eastern America, where the soil is sterile and dry, is the little partridge pea (*Cassia chamæcrista*). It begins to bloom in the northern part of its range in early July and thereafter is never without flowers until the frost cuts it down. Like many another so-called weed, its reputation for weediness is due entirely to its abundance coupled with a lack of economic value. If one will examine it with an eye for its good points only, it will be found to fully equal in beauty many of the more pretentious exotics carefully cultivated in our gardens. Indeed, the plant is not infrequently planted for the sake of its graceful foliage and handsome yellow flowers in regions where it does not grow naturally.

Beauty, however, is not the partridge pea's only claim to attention. Its manner of coping with untoward conditions makes it one of the most interesting of plants. The soil in which it delights is usually sandy and deficient

in nitrogen. To secure a proper supply of this necessary element, it has called to its aid certain bacteria that are able to obtain nitrogen from the air. These live in small nodules upon the roots of the plant. The nodules are conspicuous enough to be easily seen, but the bacteria, of course, require a good microscope for their inspection. This sort of a plant-partnership is known as "symbiosis" and has been found to exist among various other species of plants such as the clovers, heaths, etc.

The leaves of the partridge pea consist of about a dozen pairs of opposite, entire leaflets, and like those of the sensitive plant and various other members of the pea family, close at night and in stormy weather. They also imitate those of the sensitive plant by closing when touched, though with a much slower motion. On the stem of the leaf, just below the lowest pair of leaflets, is a curious lens-shaped gland about the size of a pin's head, with an opening in the center from which a sugary fluid constantly exuded. This gland has also been more or less of a puzzle to botanists. Some have conjectured that it is designed to provide food for ants in return for their protection, but this seems incorrect. The exudation is pleasing to ants and attracts numbers of those insects to the plant, but they do not seem to be of any special protection to it. The opinion is now gaining ground that the gland is simply of an excretory nature and was evolved without reference to insects of any kind. The leaves take up the crude materials from the sap and the air and man-



ufacture products useful to the plant, the waste products being thrown off through the glands. If this happens to please the ants, it is so much their good fortune.

It is interesting to note how adroitly the partridge pea, with nearly regular flowers, manages to secure cross-pollination. In the majority of regular flowers, like the oxalis and buttercup, there is a sort of indiscriminate pollination and the styles may receive pollen in various ways. More than sixty different insects are known to visit the buttercup. By a very slight irregularity in the partridge pea's flowers, however, it has been enabled to direct visiting insects to the honey in such a way as to be

most advantageous to the plant. This may be seen by a reference to the blossom. Four of the petals spread out flat, but the remaining one, a lateral petal is fashioned into shallow spoon-shape about the stamens, while the pistil extends downward



across the broad lower petal. At the base of the two upper petals and the other lateral one there are spots of crimson showing the location of the nectar. The flower is hung sidewise like a pansy, and when an insect approaches it, the broad lower petal is obviously the easiest place upon which to alight. In doing this he is likely to brush pollen from another flower upon the stigma. Moving toward the crimson spots he begins gathering the nectar in doing which he is obliged to assume positions that bring his body into contact with the stamens and thus he is loaded with more pollen for another flower. The curved petal seems designed to prevent insects from entering the flower from that side and so passing first over the stamens. It is a singular fact in this connection that about half the flowers are thus right-handed and the rest left-handed—an excellent arrangement to ensure the proper transference of the pollen.

Binghamton, N. Y.

A WILD-FLOWER GARDEN.

BY MARY E. DOCKHAM.

BECAUSE I enjoy my wild-flower garden so much I would like to tell others about it. We have a fair-sized back yard for a city residence, and along by the fences I have transplanted roots from the woods and fields, at different times until I have quite a collection. It is surprising how many kinds can be grown in a back yard if one gives thought to *situations*. Let me enumerate my plants in the order of their blooming; blood-root, hepatica, wild ginger, mandrake, violets, meadow beauty, Solomon's seal (large and small), Jack-in-the-pulpit, wild oats, wild lily-of-the-valley, wild columbine, *Smilacina stellata*, *Corydalis glauca*, herb Robert, wild geranium, red and white baneberry, painted trillium, golden ragwort, sweet cicely, black-eyed Susan, false Solomon's seal, butter and eggs, aster, and golden rod.

I am a very busy woman and find little time for rambles in the lovely places of nature. My wild flowers are my dear friends, and I can greet each one as it comes, it takes so little time to run out into my back yard—no long trolley ride before reaching the woodland beauties. This spring twenty lovely blossoms opened their pure white petals on my blood-root. My bed of hepaticas, half a yard square, was a delight to the eyes. The wild lily-of-the-valley disappointed me by having few flowers, but the mass of shining leaves made a refreshing green spot to look upon. Last fall a friend sent me tubers of meadow beauty, which I planted with a little prayer, and I was more than delighted when they showed their exquisite faces this spring. The lovely wild columbines were quite abundant. My wild geranium, a large mass, was resplendent with its entire top covered with its delicate pink-purple showy flowers. Violets had cast their seeds far and wide, so the dear blue things were all through the grass. Only one yellow one deigned to bloom, and very few white ones. Jacks, both light green and the striped ones, are flourishing. Black-eyed Susan will arrive soon.

Asters and golden rod hold festival later. Buttercups were rather too numerous on our lawn, so I filled a space about a yard square with roots of them and all summer long there is a pretty show of their golden cups, as several varieties are among them. June 17 I brought home roots of yellow-eyed grass and so far they have borne transplanting nicely.

Not all wild flowers take kindly to a back yard, as for instance wind flower and houstonia. Treat them ever so tenderly they droop and die—homesick for their “very own place.” I feel a little impatient with houstonia and want to say, “You go romping all over the fields. Why can’t you brighten a little place in my yard?”

It is so easy to make a wild-flower garden, I do hope some of your readers will have one another season. Now is a good time to commence collecting. All that is necessary is to notice the conditions surrounding the plants as you dig them up, and give them as nearly the same in your yard as possible. I am associated with teachers and it gives me delight when I can furnish them specimens for school work, or when anyone asks about a flower to step out into my yard and show one.

I have several kinds of ferns, also. A beautiful maiden hair is under the shade of a tree. Polypody is at the edge of a concrete walk, as nearly a rock formation as I could find. Crested ferns, hay ferns, osmundas, and Christmas ferns are growing very well, though I can never hope for the luxuriant growth of the woods.

You who have children or younger brothers and sisters, what better way to remind them of holidays in the woods than by transplanting some of these plants into their grass plats at home?

Chelsea, Mass.

WHITE FLOWERS.—The bright white of flowers of this color is due principally to the fact that the tissues of the petals are filled with air. By immersing them in water the air is gradually driven out and the petals lose their white color and become nearly transparent.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items.

CLEISTOGAMOUS FLOWERS.—A student of cleistogamous flowers has recently announced that under certain conditions plants that usually produce open or chasmogamous flowers will produce the closed or cleistogamous ones. These latter are said to be due in many cases to poor soil, lack of certain mineral constituents or insufficient light. The editor of this journal long ago pointed out that the Canada violet annually goes through all the changes from showy flowers to cleistogamous ones and back again, in this case the changes being probably due to temperature.

LARGEST FLOWERS IN THE WORLD.—The flowers of the rafflesia (*R. Schadenbergiana*), expanding more than thirty inches, are easily the largest flowers in the world. If our measurements were merely from the tip of one petal to the tip of another, however, a South American orchid (*Cypripedium caudatum*) would lead, for the lateral petals, from which the plant gets its scientific name, grow to the enormous length of twenty-eight inches, according to Kerner. The same author states that one of the tropical aristolochias, with whose relatives, the Dutchman's pipe and Canada ginger, we are all familiar, often grows to be fifteen inches long and somewhat wider. Children use them for caps in play and are able to draw them down over their ears. The largest flower growing on a tree is said by Kerner to be a species of magnolia (*M. Campbelli*). The petals are bright red and spread nearly ten inches. Other large flowers are, the lotus, various water lilies, cacti, and the opium poppy, which reach diameters of from eight to fifteen inches.

PROGRESS OF PLANT PROTECTION.—The original Society for the Protection of Native Plants has more than doubled its membership during the past year, and now has a mailing-list of nearly fifteen hundred members. Since the Society was organized it has issued 71,000 leaflets and nearly 30,000 other notices. This is a very good showing toward practical plant protection.

PUFF-BALL SYNONYMY.—In a recent publication by C. G. Lloyd, nearly three hundred names of puff-balls are given that in the author's judgement no longer apply to specimens of these plants. In the days when the puff-balls were only imperfectly known, many new species were described from insufficient material and having since turned out to be the same as better-known species, their names become synonyms. Other names in this list belong to the class of "juggled names" as the author calls them, in which authors, in the desire to get their own names after a species, have changed the plant from one genus to another with this end in view. Mr. Lloyd has gone a long way toward making puff-ball nomenclature stable.

AUTHOR CITATIONS IN BOTANY.—We are all familiar with the custom in modern botanical literature of printing the names of one or two botanists after the scientific name of each plant. These authors may be regarded as the plant's sponsors, and if botanists can be induced to always print the names in this way, those whose names appear in such connections have arrived at a cheap immortality. The time was when a single botanist's name after a species was sufficient, but when the possibilities of making new combinations of generic and specific names were realized there was a general rush for notoriety in this way until now every plant name that can be twisted into carrying a double load of name-tinkerers, has seemingly received attention. When two names appear after a species, the one in parenthesis is supposed to be that of the author who really described the species, and the other to be the one who placed it in its proper genus. Only those authors who were lucky enough to get their

new species so securely anchored in the right genus as to be inseparable from it are safe from the indignity of being shut up in parenthesis by some later juggler of plant names. To slightly paraphrase "Poor Richard," it may be said that these modern nomenclaturists are a superstitious lot, great observers of forms, dates and places of publication and they stick to their cabalistic signs with a pertinacity that shows that a great value is set upon this literary method of embalming. Notwithstanding the merits of this procedure for all botanists who need embalming, there have always been a few writers to point out that just so long as this prize is held out to ambitious botanists, just so long will name-tinkerers labor to shut up other botanists in parenthesis and to parade their names before the public. It has, therefore, been proposed, as one of the surest ways of causing nomenclature to become fixed and unvarying, to remove this inducement to authors by refusing to print their names with the species. In other branches of natural science only the original describer of the species is printed, and it has been proposed in botany to leave off both authorities. In fact, this is already being done by the National Government in work intended for popular reading, and by some scientists notably Mr. C. G. Lloyd whose papers on fungi are always thus published. It may be added that in the eight volumes of THE AMERICAN BOTANIST thus far published we have not found it necessary to print the author-citations in order to be understood. Even at this late day there are undoubtedly cases in which new species must be published, but so much has been made of the fetich of "priority" that those who have contributed most to the upheaval in plant names have contributed least to real botany. When a botanist gets to the point when no subject appeals to him except a change in name, he should cease to lay claim to the title of botanist.

Editorial.

This is the last time we shall offer to supply, free, missing numbers of the first six volumes of this magazine. The demand for these numbers has about used up our supply and we cannot break the few sets remaining. To all our subscribers, therefore, we say, look over your first six volumes and see that all the numbers are present and in good condition. We will replace defective and missing numbers free if notice is sent us at once. If you wait until later, you may have to buy the entire volume to get a number you want.

* * *

We take considerable satisfaction in calling attention to the fact that this magazine is again issued on time. Owing to a press of business last winter some numbers were nearly sixty days late but we have caught up without doubling up on our numbers and with our subscribers' help we intend to come out on time in the future. And while we are on the subject we want to invite our readers to help us push the magazine a little more strenuously. If we can get a single hundred more subscribers we will add four more pages to each issue of this magazine. It is thus to every reader's advantage that the magazine prospers. Will you not help us? You do not need to hunt for botanists to secure subscribers. Anybody who loves the wildflowers ought to subscribe and doubtless will if the matter is properly presented to them.

* * *

Now that the Vienna botanical congress has adjourned it is only our respect for the feelings of the radical botanists that prevents our saying in large type "I told you so!" The official report has not yet got around to this office but we learn from private sources that the name-tinkerers did not have things much their own way. So far as the congress is concerned the nomenclature of the next few years bids fair to be of the same conservative

nature as that which has always characterized the names used in this journal. One of the things that will bring delight to many is the statement that that abomination, a repetition of the generic name for the specific one, of which more than eighty have been proposed, is buried too deep to ever come to light again. *Apios apios* and *Sassafras sassafras sassafras* are gone forever. *Requiescat in Pace!*

* * *

We expect to issue indexes to the remaining four volumes of this magazine as soon as the printer can attend to the matter. If you bind your magazines you need the indexes. They may be had now for the asking.

* * *

The suggestion, made on another page that all who can should have a wild garden, is one worth the attention of every lover of plants. The popular mind frequently divides the vegetable kingdom into plants, flowers and weeds—plants being those we cultivate for food or ornament, flowers those we grow for their blossoms, and weeds the wild plants of the locality. It is incorrect, however, to assume that all our wild plants are weeds. Many of them are cultivated in flower-beds abroad, while all that we cultivate for their flowers are wild in some part of the world. In our own wild plants one may find a fruitful field for observation and study, and if they are planted about the house where we can visit them in spare moments we are likely to gain great pleasure from watching them grow for a single summer. The bulbous species are also among the early spring flowers and appear when there are few kinds of cultivated blossoms to be had. Plants dug up now will almost surely bloom next spring. Some of the most satisfactory are the bloodroot, hepatica, trillium, columbine, bane-berry, violets, Canada ginger, colt'sfoot, anemones, lupine, lilies, closed gentian, bell-wort and butterfly weed. Almost any wild plant will thrive, however, if given a proper chance. If there are any plants you fancy, dig them up and plant them in the home grounds.

BOOKS AND WRITERS.

Mr. O. W. Barrett, whose contributions in this journal have interested many readers, has resigned his position as Entomologist and Botanist of the Porto Rico Experiment Station to accept the position of Plant Introducer of the United States Department of Agriculture with headquarters at Washington. He will have charge of the distribution of the tropical and sub-tropical plant stock as well as the inspection of incoming and outgoing shipment of such stock.


A curious little booklet that no doubt will prove most attractive to children interested in nature studies is "My Own Book of Three Flowers that Blossom in April and May" by Anna Botsford Comstock. The flowers selected are such common ones as hepatica, trillium and spring beauty. There is a photograph of each of the six plants considered, a conventional design suggested by the plant, two pages of popular descriptive text for each, two pages of questions for the child to answer about each flower, and in addition room for the child's own description of the plant and a water-color sketch. It is safe to say that the child that follows out the suggestions made in this book will add much to his knowledge of the plant. (New York, The American Book Co., 1904.)

In 1886 Professors Arthur, Barnes and Coulter issued a little book on "Plant Dissection" and this, revised and rewritten by Otis W. Caldwell has recently appeared under the title of "Plant Morphology." Essentially it is a series of directions for the study of the structure and methods of reproduction of a series of plants illustrating all the principal groups, beginning with algæ. For the most part the student is told what to observe and few questions are asked. At the beginning and end of each study is also more or less information or phases of the subject not easily observed in the laboratory. There is an unusually good glossary but the author's ideas of periodical botanical literature apparently need revising. (New York, Henry Holt & Co., 1904.)

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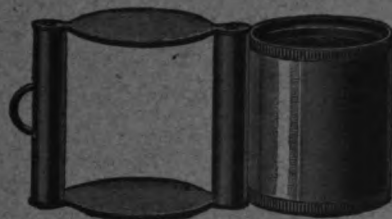
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THE AMERICAN BOTANIST.

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BINGHAMTON, N. Y.
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WILLARD N. CLUTE, - - - EDITOR.

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1905

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THE PAPAWE FRUIT.

THE AMERICAN BOTANIST.

VOL. IX.

BINGHAMTON, N. Y., NOVEMBER, 1905.

No. 5.

THE FRUITING OF THE PAPAW.

BY WILLARD N. CLUTE.

IT IS well known that the papaw (*Asimina triloba*), though producing several pistils in each flower, rarely sets any considerable number of fruits. It seems to be an exceedingly rare occurrence for any flower to produce more than a single fruit, and by far the larger number of flowers, at least near the plant's northern limit, fail to produce fruit at all. Something similar occurs in the case of the milk-weed which after a great display of flowers can usually show not more than two or three seed-pods.

The milk-weed's lack of fertility is supposed to be due to its specialized method of pollination which is successful only in rare cases, but the papaw is pollinated much as ordinary plants are and one would think might even be self-pollinated were it not that the pistils are somewhat longer than the stamens. The stigmas appear, however, to ripen a trifle earlier than the anthers and this with the difference in length points to the conclusion that the flowers are adapted for cross pollination. If this is true, we reasoned, the lack of fruits might be due to the absence of the proper insects for the transfer of the pollen. Desiring to test this theory, we cross pollinated a large number of flowers by hand, last spring, and were pleased to find that the theory appears to be correct. In many cases half a dozen or more fruits started from a single blossom. None of these, however, continued to maturity, but dropped from the plant when not more than an inch in length. Whether the shrub lacked the vitality to bring them to maturity, or whether the pistils were not adequately pollinated remains to be discovered another season. That a lack of proper insects for pollinating the flowers is at the

bottom of the matter is shown by the fact that none of the blossoms that were not artificially pollinated, produced more than a single fruit

Single fruits were rather common this year in northern Illinois, and we noticed quantities for sale on the fruit-stands of Chicago. The fruit seems rarely to ripen on the shrub, but may be found among the fallen leaves still hard and puckery to the taste. After lying for a time, however, they begin to soften and gain in sweetness the change being due, no doubt, to the digestion of the starches and other substances by a vegetable ferment, as in the similar cases of the banana and persimmon.

Joliet, Ill.

METAMORPHOSIS.

BY DR. WM. WHITMAN BAILEY.

IT is not popularly known, though men of science are well aware of it, that the poet Goethe had a profound influence upon botanical theory. One at all familiar with the philosophic discussion in "Faust" and other of his works, is not surprised at this. He was, to be sure, not always equally happy in his interpretations of nature. His theory of optics, for example, is still held to be absurd, but with the poet prescience, he saw far ahead of his time, and with very lucid vision. To him we owe the generally adopted theory of the flower, which goes to show that it is a metamorphosed branch, the lateral members of which are, therefore, leaves. This refers then all the floral organs, however diverse in appearance, to a foliar origin. It does not claim that any particular flower has, at some time in the course of its development, existed as an ordinary branch, but that a branch which would under ordinary conditions have some green leaves, has been set apart, "metamorphosed" is Goethe's word, to do the work of reproduction. To-day the theory is modified and extended and the claim made that all parts of a plant are morphologically to be referred to one of several factors, viz: root, stem, or leaf. This rule is the key to many a puz-

zle; position, rather than function, determining the nature of the object under discussion. Thus, a leaf may function as a branch, or a branch as a leaf; a portion of a leaf as a tendril or spine, or a branch of the same.

Goethe came to his conclusion at about the same time that the botanist Wolf independently worked at the same idea. Both worked on double flowers, like roses and carnations. It is indeed, easy to see in such cases that certain important portions of the flower have reverted to leaf forms. Often, indeed, the change goes farther, and they even become green. Again, in pond lilies we note a series of almost imperceptible gradation from the sepals to the stamens. Nothing can be more instructive than these conditions, normal or abnormal, when viewed in this light of constructive metamorphosis.

Brown University, Providence, R. I.

FROM THE MOUNTAINS OF NORTH CAROLINA.

BY EDWIN D. McHOSE,

IT has been said that no section of our country covers such a large range of species and offers such delightful surprises to the botanist as does the mountain region of North Carolina. Perhaps the sand regions near Chicago boasts of a greater variety in a small area, but the headwaters of the Tennessee, the Broad and the Swannanoa rivers, water an area that is probably unsurpassed for its variety of species and of landscapes. There is a profusion of both.

In the mountains is found the flora of our northern states and in the lowlands the flora peculiar to the South. The large mountain laurel for example. (*Kalmia latifolia*) grows in dense thickets and even reaches a height of twenty feet. It is also abundant here in Pennsylvania in the mountains.

I have had a desire for some time to gather the *Sabatias* but was told while in Asheville that one could hardly expect to find any in that section. While botanizing up

Sunset Mountain, near Asheville, I saw what at first I decided to be *Phlox* some of which I had just gathered, and yet I was not sure but kept turning around to look at the pink corollas and suddenly the thought flashed: Might they not be *Sabbatia*? They were—*Sabbatia angularis* as I determined a few days later at the Biltmore Herbarium.

This Herbarium is a part of the vast estate, which is said to include 140,000 acres owned by Mr. Geo. Vanderbilt.

In that region of floral wealth, the Herbarium is a valuable institution, where the collector can stop to determine difficult species and where the southern flora is rapidly being catalogued. Though only in existence ten years, there are no less than 50,000 sheets. Mr. C. D. Beadle who is at the head of the forestry department of the estate is a specialist on the genus *Cratægus*. In a recent number of the "Biltmore Botanical Studies" he published twenty one descriptions of as many varieties of that genus. Messrs. F. E. Boynton, C. L. Boynton and T. G. Harbison are associated with Mr. Beadle in botanical research. The Herbarium is equipped with an excellent botanical library of over 2,000 volumes. Among the very valuable reference works are the 122 Vols. of *The Botanical Magazine*, from Vol. I, published in London in 1793, to the latest monthly. The coloring of the first volumes is not surpassed by the most up to date methods of printing colored plates—the colors of plants pictured in Vol. I are not in the least faded that one can see.

The Herbarium rendered good service to all plant lovers in the matter of the Stephen Elliot collection. For lack of attention and care, the specimens were being destroyed by time and insects in a Charleston college. Mr. Beadle got permission to bring the collection to Biltmore where it is being put in order, properly catalogued and fumigated until the college can furnish better quarters for it. I dare say there is no institution in the South that is doing as much for the science of botany as is the Biltmore

Herbarium. Its interests are purely scientific and Mr. Vanderbilt is to be congratulated on its growth and its work.

Schuylkill Seminary, Reading, Penn'a.

INSECT GALLS.

BY FRANK DOBBIN.

THE insect gall is a familiar sight to the rambler in the autumn fields. On twigs and leaves of the oak, the willows, the wild rose and the stems of golden rod, one cannot fail to notice these peculiar growths. That they are abnormal growths is at once apparent.

One of the most familiar is that enlargement of the stem of the golden rod just below the flowers, known as the golden rod ball gall (*Trypeta solidaginis*, Fitch). The balls are usually about an inch in diameter and have a pithy inside with a rounded cell in the center containing the larva. Sometimes as many as three are on a single stem. There are two other common golden rod galls: The bunch gall (*Cecidomyia solidaginis* Loew) which is produced by an arresting of the stalk, causing the leaves to accumulate in a large bunch at the end, and the side gall (*Trypeta polita* Loew) caused by the arresting of the side branches on which accumulates a small bunch of aborted leaves. Near the base of this bunch is the hollow in which the larva lives. This form is usually found on stalks of *Solidago altissima*.

The different species of wild rose have several forms of galls. One of the most common of these being the mealy gall (*Rhodites ignota*). These have a rounded woody body covered with a white mealy substance. Sometimes two or three grow together making a body nearly as large as a walnut but usually they are only about the size of a pea. They are found on the leaves. Another to be found on the twigs of the wild rose is the spiny gall. (*Rhodites bicolor*) a small body one-half inch or less in diameter covered with long prickly spines. It is yellowish green in summer and brown in winter. The common cinquefoil

(*Potentilla Canadensis*) furnishes a curious little gall in the axils of some of its leaves. It is about the size of a large pea, green in summer and brown in winter.

The gall flies seem to be partial to the different species of the oak, for not only the leaves but the twigs of these trees are made the receptacle for their eggs and in time produce the cradle for the larva. Everyone has picked up the common oak apple (*Amphibolip comluentus*), which grows on the red oak and nearly related species. It is sometimes filled with a spongy substance in the center of which is a hard kernel containing the cell. Another gall very similar in appearance grows on the leaves of the scarlet and red oaks. It is somewhat smaller and when broken appears to be empty. If broken carefully, however, it will be seen that the larval cell is kept in its place in the middle by means of some stiff radiating threads or filaments. It is known as the empty oak apple (*Amphibolips inanis*). I once saw a large oak near Newburyport, Mass. on which were thousands of these galls with thousands more fallen to the ground beneath. A whole swarm of flies must have attacked this tree at once.

The so-called bullet gall (*Holcaspis globulus*) is common on the terminal twigs of the white oak. A round hard body sometimes three-fourths of an inch in diameter. It is yellow or reddish in summer but brown and hard in winter. On twigs of the swamp white oak (*Quercus planatanoides*) there occurs another bullet gall (*Holcaspis duricaria*), which is very similar in appearance to the preceding. It has a sharp little point on the end and for this reason is called the pointed bullet gall. The oak petiole gall (*Audricus petiolicola*) is common at the base of the midrib on leaves of the white chestnut, swamp white and post oaks. It is a hard irregular woody growth about three-fourths of an inch long and contains several cells.

The gall-gnats, a family of small flies, are responsible for many galls some of which are found on willows. One the egg gall (*Euura ovum*) appears as an elongated nodule on twigs of willow growing in swampy places. Some-

times a row of three or four will be found on the same twig. Another one common on willows is the club gall (*Cecidomyia rigidae*) which is an enlargement of the stem tapering to a point. It usually has several small terminal buds growing from it. The pine cone gall (*Cecidomyia strobiloides*) is a conspicuous object on low willows after the leaves have fallen. It is about an inch in diameter composed of many imbricated leaves in the form of a cone. I am told that this gall was once considered a characteristic of the plant and the willow received a specific name in consequence. It is now known that these galls occur on several kinds of low willow. The willow galls, if cut open, will be found to contain a bright colored maggot. That of the egg gall being pink and that of the club gall a dark red.

Only a few of the more common galls have been mentioned here. They may be looked for on the basswood, elm, poplar, ash, alder, witch hazel, sumac, hickory, honey locust, wild cherry, grape, tulip tree, hackberry, huckleberry, wild lettuce and touch-me-not. In fact over eighty different galls are known to occur in the eastern part of this country.

Shushan, N. Y.

TROPICAL FRUITS.

NATURE is at her best in the tropics. It is here that vegetation grows most luxuriantly, that the flowers reach their greatest size and most brilliant coloring, and that the fruits develop the most unusual shapes, odors and flavors. With some of these fruits, such as the fig, date, pineapple, orange, lemon, lime and banana we are so familiar that we may fall into the error of supposing that these are the only fruits worthy of the name to be found in the warmer parts of the world; on the contrary the fruits are as abundant and as varied as the flowers, and many of them are certain to prove palatable to people of more temperate regions, but their perishable nature prevents

their appearance in markets nearer the poles except occasionally as curiosities.

It is possible, however, for the term tropical fruit, to be a misnomer, for there are many regions within the tropics where pears, peaches, plums, cherries, grapes, strawberries and other small fruits familiar in temperate gardens grow and fruit abundantly. We must remember that while temperature constantly decreases from the equator to the poles, it no less steadily decreases from sea level to the tops of the mountains even at the equator. Thus it happens that one may find in tropical markets, fruits regarded as typical of temperate regions neighboring those that can only be produced in warm countries. In cold regions, by means of hot houses, man may coax the warm country plants to fruit, but in the tropics, nature often plays into the hands of the cultivator by producing a cool and elevated region close to one that is strictly tropical in the ordinary sense of that term.

Not all of us can visit the tropics, but there is a certain fascination in reading about the strange fruits there produced. The very names of many of them are strangers to our ears, and while the names of others may have been made more familiar by works of travel, the fruits themselves would be no more easily recognized. A list of the fruits that are commonly cultivated in Ceylon was recently given in *Indian Planting*, and from this we extract, with some additional remarks, some of the most interesting examples.

After the fruits commonly exported from the tropics to temperate regions, must be mentioned the mango (*Mangifer Indica*) which in its season forms a large part of the native diet. It is borne on trees of medium height which resemble the magnolia in habit. The fruits are borne in clusters on long stalks and are about the size of a large peach. Most mangos have a terpenine like flavor that at first is a bar to the enjoyment of the fruits. There is a single large stone in the center covered with long fibres, much like a cotton seed is. The mangosteen (*Garcinia man-*

gosteen and the durian (*Durio zibathinus*) are two fruits that natives of the tropics usually value more highly than any other fruit; indeed the mangosteen is often called the most delicious fruit in the world. The durian, though possessing a disagreeable odor, is regarded as nearly its equal in flavor, and is greedily eaten by all sorts of animals. The jack fruit (*Artocarpus integrifolia*) is another large fruit with an exceedingly disagreeable odor that is pleasing to most palates if the odoriferous morsel can be gotten past the nose. The jack fruit is the nearest relative of the bread fruit (*Artocarpus incisa*) and both are as large as a man's head or larger.

The sour sop (*Anona muricata*) the bullock's heart (*A. reticulata*) the custard apple (*A. squamosa*) and the cherimoyer (*A. cherimolia*) are a group of related fruits that find favor throughout the tropics. The trees that produce them are of medium size, not unlike peach trees in habit, though the fruits of most are much larger than peaches. The fruits are heart shaped and contain a soft custard like pulp. The trees are natives of the West Indies.

The names of the guava (*Psidium guyava* and *P. catleyanum*), persimmon (*Diospyros kaki*), pomegranate (*Punica granatum*) avocado or "alligator" pear (*Persea gratissima*) and the papaw (*Carica papaya*) are familiar to all readers of articles on tropical botany, and all but the last may be found during the season in the markets of the larger cities in temperate regions. The persimmon, pomegranate and alligator pear, especially, are steadily gaining favor in America. The papaw is not related to the native North American tree by that name. In appearance it has considerable resemblance to a large castor-oil plant (*Ricinus communis*) and is usually to be found in any large conservatory. The large melon like fruits are the source of a vegetable pepsin.

Less familiar, perhaps, but well known to all visitors to the American tropics, at least, are the rose apple (*Eugenia jambos*), loquat (*Photinia japonica*), tree tomato (*Cypho-*

mandra betacea) and sapodilla (*Achras sapota*.) The loquat, as its name indicates, is a Japanese tree of medium height, belonging to the apple family. Its fruit resembles the crab-apple but differs in flavor. The rose apple is also a medium sized tree with white and rose-tinted fruits as large as an egg, containing a sweet snow-white pulp. The fruits of the tree tomato may be likened to goose-berries though they are as large as the largest plums. They are used fresh or preserved and in the West Indies are known as vegetable mercury from their action on the liver. The sapodilla is also called the naseberry. It is an oblong fruit like a large peach, brown in color and full of a granular sweet pulp.

Other names in the list from which we quote are entire strangers to the writer but the descriptions sound attractive enough to make one wish for an opportunity of testing their qualities. The rambutan (*Nephelium lappaceum*) is noted as a large spreading tree with bur-like, yellowish red fruits which contain a pleasantly acid white aril around the seed. This is evidently a relative of the chinese nut or litchie (*N. lichi*) found so commonly in our fruit stores, if indeed it is not the same thing under a different name. The Brazil cherry (*Engenia Micheli*) has bright red, tomato-like fruits that are acid and slightly aromatic. This is another fruit of the rose apple family. Related to the mangosteen but less valued is the Cochin goraca (*Garcinia Xanthoscyamus*) with very acid, yellow, apricot-like fruit. The uguressa (*Flacourtia Rammontchii* var. *cataphracta*) is described as a thorny tree bearing large dull red or purple berries and an allied species the lovi-lovi (*F. inermis*) bears bright red, very acid cherry-like fruits. The Kamaranga (*Averrhoa carambola*) with juicy winged fruits the nam-nam (*Cynometra cauliflora*) bearing short thick juicy pods on the trunk, the Ket-embilla (*Aberia Gardneri*) with purple velvety fruits like gooseberries, the Kei apple (*Aberia caffra*) and the Davidson plum (*Davidsonia pruriens*) are among the other fruits that are names only to those of temperate climates.

It is doubtful if the carobs or locust beans (*Ceratonia siliqua*) would be ordinarily classed with the fruits but they are certainly entitled to a place. The husk or pod is the part eaten. It is used mostly as a food for cattle' but it also form a part of the native diet and are to be found in a large number of American fruit stores, often under the name of St. Johns Bread. To the same family belongs the tamarind (*Tamarindus Indica*) which looks like a large locust tree and bears red-brown pods like bean-pods in which is a very acid pulp.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

THE NUMBER OF CULTIVATED PLANTS.—It is estimated that less than a thousand different species of plants are cultivated for food in various parts of the world. The real staples, however, like rice, corn, and potatoes make up less than one quarter of this number.

VITALITY OF WILLOWS.—We are all more or less familiar with the fact that willow twigs will take root and grow if given half a chance but a rarer phase of the subject has recently come under the editor's notice in which a large branch split from the main trunk in such a way as to still remain in position, had sent out an abundance of roots from the injured surface. These penetrating the moist space between branch and trunk have finally reached the ground, a distance of four or five feet, and there taken root, thus providing the supply of moisture that was interrupted when the branch was broken.

VALUE OF FRUITS AS FOOD.—A writer in a recent number of *The Lancet* maintains that fresh fruits materially aid the body in taking up iron. Much of the iron in our food is said to be insoluble and therefore not assimilated but by the action of fruit acids malates, citrates, etc. are formed in which form the iron can be used.

MEADOW LILY.—Mr. Leston A. Wheeler, Jamaica, Vt. writes that all his meadow lilies (*Lilium canadense*) are yellow. This is apparently the state of things throughout most of New England. There are occasional reports of red lilies, but these are possibly turk's-cap lilies (*L. superbum*) mistaken for meadow lilies. It is also noticeable that the turk's-cap lilies do not appear to change color with the locality. They appear to be red whether growing in New England or New York. Greater mystery thus attaches to the change of color in its relative. If any of our New England readers have found yellow turk's-caps, we would be glad to hear from them.

BLACK NIGHTSHADE BERRIES EDIBLE.—The note on page 75 of the October number of the *Botanist* reminds me of an incident which occurred in my class in Botany nearly thirty five years ago. I was lecturing on the properties of the plants constituting the Solanaceæ, and, as a matter of course, said that the berries of the black nightshade (*Solanum nigrum*) were poisonous. A young fellow from Fort Dodge, Iowa, spoke up and said that the people in his neighborhood made them into pies, preserves, etc. and ate freely of them. I answered him, as became a professor of botany, by saying that as it was well known that black nightshade berries are poisonous, the student must have been mistaken. That was the young professor's way of settling things, and this particular thing remained settled for him for some years. After a while, however, I learned that the people in central and western Iowa *actually did* eat black nightshade berries, and they were not poisoned either. Later, I learned the same thing in Nebraska for this species, and still more for the spreading nightshade (*Solanum triflorum*), whose larger berries

were freely used by the pioneers in the early days when other berries were scarce upon the Great Plains. [Prof. Bessey's communication adds another of the reputed poisonous species of nightshade to the edible list. It may also be news to some that the fruit of the egg-plant (*Solanum esculentum*) is really a nightshade berry and it may be inquired in passing whether any of the berry-like fruits of the nightshade family are poisonous when fully ripe. Among those that are not, may be mentioned tomato (*Lycopersicum*) red pepper (*Capsicum*) and ground cherry (*Physalis*.) The editor has eaten the berries of matrimony vine (*Lycium*) but cannot recommend them.]

HONEY-GUIDES CHANGING COLOR.—Another flower to be added to the list of those published recently in which there is a change of color in the honey-guides due to age, is the catalpa. This flower opens with the corolla streaked and dotted inside with purplish and in addition, along a groove in the lower petal which leads to the nectar, there is a series of yellow blotches ending at the entrance to the flower in two diverging streaks. These yellow markings soon turn to orange and later assumed a brick red or magenta hue, so that one can tell approximately how long the flower has been open by the color of these honey-guides.

EFFECT OF CLIMATE ON PLANTS.—Climate is doubtless the most important factor in modifying plants. Not only does it absolutely limit the range of species north and south, but in such species as are distributed through many degrees of latitude, it influences the form, color and fruitfulness. By comparing northern and southern plants of the same species we find that the cold tends to dwarf the plant but to increase the leaf surface. Northern plants are usually more fruitful than those from the south and the flowers are larger and deeper in color. Warm climates, on the other hand, tend to increase the production of essential oils, and alkaloids but nectar is most abundant and contains the most sugar in northern lands.

WHAT THE BEE DOES WITH POLLEN.—Many flowers that secrete no nectar are visited by bees who carry off the pollen. In *Country Life in America* Mrs. Anna Botsford Comstock tells us that the bee uses the pollen to form the bee bread used as the food of young bees.

SENSITIVE PISTILS.—Many flowers like the kalmia and barberry have sensitive stamens which spring up and dust visiting insects with pollen, but cases of flowers with sensitive pistils are less frequent. They occur, nevertheless, in several common flowers, among which may be mentioned the catalpa, trumpet-creeper (*Bignonia*) and monkey-flower (*Mimulus*). In these the stigma is bifid and spreads out until an insect comes in contact with one of the lobes when it at once closes. By touching such a stigma with a stamen from the flower, this closing may be observed in many cases.

DISAPPEARING STAMENS.—We are so accustomed to find at least one stamen for each petal of the flower that the blossoms of the mints and figworts containing fewer stamens seem curiously lacking in these organs. The novice is likely to wonder whether these plants have always been that way, and if not, how they lost their missing parts. Probably we shall never know exactly how it has been brought about, but the *why* of the subject seems best explained upon the supposition that having a most effective means of dusting insects with pollen by the use of two or four stamens the flowers can do without the others. It is likely that these unnecessary stamens gradually dwindled away and disappeared. We can see evidences of a fifth stamen in many of the figworts, notably in the beard-tongue (*Pentstemon*) where it forms a bearded organ larger than the fertile stamens. In other plants it forms a nectary. The blossoms of the catalpa exhibit an interesting series of stamens in various stages of development. In the normal blossom there are but two perfect stamens, but the other three are usually present, sometimes as mere threads at the base of the flower, at

others larger and producing some pollen and in still others as large and as well developed as the two that are normally developed.

PELORIA.—*The Gardening World* recently figured a case of peloria, as it is called, in the common English fox-glove (*Digitalis purpurea*) in which the terminal flower in the inflorescence, instead of being turned sidewise and irregular in shape was erect and regular, that is each petal was shaped exactly like the others. It is said that "monstrosities" of this kind can be bred up until most of the flowers in the spike present this peculiarity. The same journal notes that peloria is also common in the toad-flax (*Linaria vulgaris*), the snap-dragon (*Antirrhinum majus*) and the various species of *Pentstemon*. It may be added that all irregular flowers may be expected to produce these examples of peloria at times and when one comes under the notice of the student he can usually produce a race possessing the peculiarity by carefully breeding from his specimen.

AMERICAN CRESS.—There appears to be no accounting for the common names of plants upon a reasonable basis. The plant that, according to Gray, Americans have imported from Europe and cultivated under the names of early winter cress or scurvy grass (*Barbarea præcox*) is cultivated in that country under the name of American cress. According to the editor of *Gardening World* this plant is not native to the British Isles, but Gray denies it a resident in America, so that when found it appears to be an immigrant from some other region, possibly continental Europe. How it came by the name it bears in England is something of a mystery. *Gardening World* suggests that it may have been due to its introduction into cultivation from America. The common species of *Barbarea* (*B. vulgaris*) is supposed to be native to the northern parts of North America but to be introduced southward. At any rate the plant bears the ear-marks of an alien, growing nearly always not far from cultivated grounds and thriving in fields and along roadsides.

FROST-WEEDS.—The rambler during the cold mornings of late autumn or early winter may chance upon a curious phenomenon in the frost crystals that develop from the base of the stems in certain plants. The cause of these frost crystals seems as yet imperfectly understood, but the fact that they occur is so well known that certain species are known as frost weeds or frost plants from the frequency with which they exhibit them. The best known of the frost plants is the common rock-rose (*Helianthemum Canadense*) but the phenomenon is known to occur in many others, and is very common in the dittany (*Cunila Mariana*). One observer has written of it: "Our *Cunila* has attached to the stem a shell-work of ice of a pearly whiteness, beautifully striated, sometimes like a series of shells, one within another, at others curved round on either side of them like an open polished bivalve; then in others again curled over in every variety of form like the petals of a tulip." The crystals form when the temperature is above zero and appears to be due principally to capillarity and the contraction of the stem due to freezing.

THE MOVEMENT OF PLANTS.—One of the main distinctions between plants and animals made by the uneducated is that animals move about and plants do not. Such a rule, however, has about as many exceptions as it has cases that agree with it. It is true that the mature flowering plants cannot change their locations, but their children can as may be seen on any autumn day when multitudes of travelling seeds,—which are essentially cases containing small plantlets,—are to be found moving about in various ways. Among the lower plants, such as the algæ, many mature plants can move about, (good examples may be found among the diatoms and the *Oscillatorias*) while among the lower animals there are numerous instances of mature forms that are fixed to their locality, such as the oyster, sponge, coral polyp and barnacle. The higher plants, however, while they cannot move about, can move various parts and do

so constantly. The sensitive plant is one of the best instances we have, but the sundew and Venus fly-trap are not far behind. Other forms of motion in plants are recognized in the turning of roots in the soil, the turning of leaves to the light the reaction of stems to light, the coiling of tendrils and the so-called sleep movements of plants.

SECOND HAND VARNISH.—The resting buds of many trees and shrubs are covered with a resin or varnish that acts as an effectual barrier to the rain and snow of winter. This varnish does not lose its usefulness when the bud scales have served their purpose, but is gathered by bees for their own uses. *Country Life in America* says that bees have been seen gathering this varnish from the poplar, horse-chestnut, birch, willow, alder and the balsam fir.

THE MEDLAR.—The Medlar (*Mespilus Germanica*) is an Old World fruit related to the apple and quince, well known by reputation at least from the fact that it is not edible until it begins to decay. The ripe fruits are hard and unpalatable but if allowed to lie for from two to four weeks they become soft and edible. The decaying process is called bletting, and is probably similar to that which causes the persimmon and banana to slowly turn from astringent hard fruits to soft sweet and edible ones. This is accomplished in the case of the banana and persimmon at least, by vegetable ferments which change the starches and tannins to sugar and it is quite likely that this is the case with the medlar also. Real decay, as we understand it, is caused by bacteria breaking up plant substances into simpler ones. It is probable that the Medlar does not need to actually decay to become edible.

Editorial.

The indexes for the first four volumes of this magazine have been published and may be had for the asking by any reader who owns these volumes. The "copy" for indexes to all the other volumes is now ready for the printer and we expect will soon be issued.

* * *

For some years the editor has been preparing a book on the fern allies and this was recently issued by the F. A. Stokes Company of New York. The fern allies comprise a curious company of plants that, with the ferns, constitute the Pteridophyta one of the four great groups into which the plant kingdom is divided by botanists. They stand midway between the mosses and the flowering plants; in fact bridge the gap between the two. Among them may be found the scouring rushes, the ground pines, the quill worts, the selaginellas, the pepper-worts and many others whose strange forms and unusual manner of fruiting make them attractive to the collector and plant lover. One of the chief reasons for putting this book together was the fact that there are no other books that treat of the subject in an untechnical way. The plants are mentioned in all works devoted to the Pteridophyta, but the beginner cannot always identify his plants from a brief technical description. A large number of these species, too, have never been previously illustrated, and some of those that have, were published in works not easily accessible to the novice. In the present volume all have been illustrated and described in untechnical language and there are additional helps to the identification of the species in the shape of seven keys. The life history of each species has been given so far as known. It is expected that the beginner will now be able to identify his plants with ease, but if the users of this book meet with any perplexities in the process, the editor will be glad to set matters right if specimens are sent to him.

Most readers are aware that a serious strike of the printers is threatened for the first of the year. Even the great magazines are preparing for delays in publication by notifying their readers that they may not appear on time after January. We do not anticipate any delay in the publication of this journal, but if it should not appear on its regular dates our readers will understand why. Twelve numbers will be issued in 1906 as usual.

BOOKS AND WRITERS.

The *Nature Study Review* announces that at the end of its first volume it will be changed to a monthly and issued for the nine months of the school year.

A series of twelve panels of California wild-flowers reproduced by color photography from the original paintings by Mrs. Elizabeth Hallowell Saunders, has recently appeared. The arrangement and coloring of the specimens reflect great credit upon the artist and appear to have lost little in the reproducing. Accompanying each plate is a short account of the plant illustrated which gives the most important facts about them.

The publishers of *Country Life in America* announce that next year the subscription price will be advanced to \$4.00 a year. It is becoming patent all along the line that publishers of outdoor literature have been giving more than they can afford to for the price. After all, any magazine is worth just as much to each reader as he can get out of it. It cannot be judged by the quality of its paper or the number of its pages. The final test is how much is its worth to you. If you can get a dollar's worth out of a dollar magazine, that is the magazine for you to buy. if the value advances with an advance in price, everybody should be satisfied.

The editor of *The Apteryx* says that owing to the pressure of business, the delinquency of subscribers and the lack of co-operation by those in authority the mag-



botanist visits the South he always finds much in the vegetation to interest him, and it would seem as if all that is needed to awaken the Southern people to an appreciation of the wild flora is some such missionary as the *Agriculturist*.

BOOKS AND WRITERS.

Country Life in America now has a dangerous rival in the *Country Calendar* which is so nearly like it in size, text, type, paper, and illustrations that one has to look at the title to be sure which magazine he has in hand. The publishers of both magazines have plenty of money and we anticipate a very pretty race from rivals so evenly matched. The competition raised ought to be good for readers, writers and advertisers, alike. After some years of experience *Country Life* is a handsome magazine, and the *Country Calendar* though new is not a bit behind it in contents and appearance. The latter is published by the *Review of Reviews* Company.

"Methods in Moss Study" by C. J. Maynard is a unique contribution to bryological literature. The author is apparently less interested in his pupils learning the names of a large number of mosses than he is in their acquiring the power to reason correctly about the structures that come under their notice. The matter in the book is arranged in twelve lessons which discuss the structure, manner of growth and methods of spore production and dissemination in some thirty mosses. Each lesson is accompanied by a plate in duplicate which is intended to be colored by the student, though copies with the plates already colored may be obtained. The book is likely to be of great service to young students leading them to consider the evolution of their plants. (West Newton, Mass., C. J. Maynard, 1905, Pp. 128, \$1.25.)

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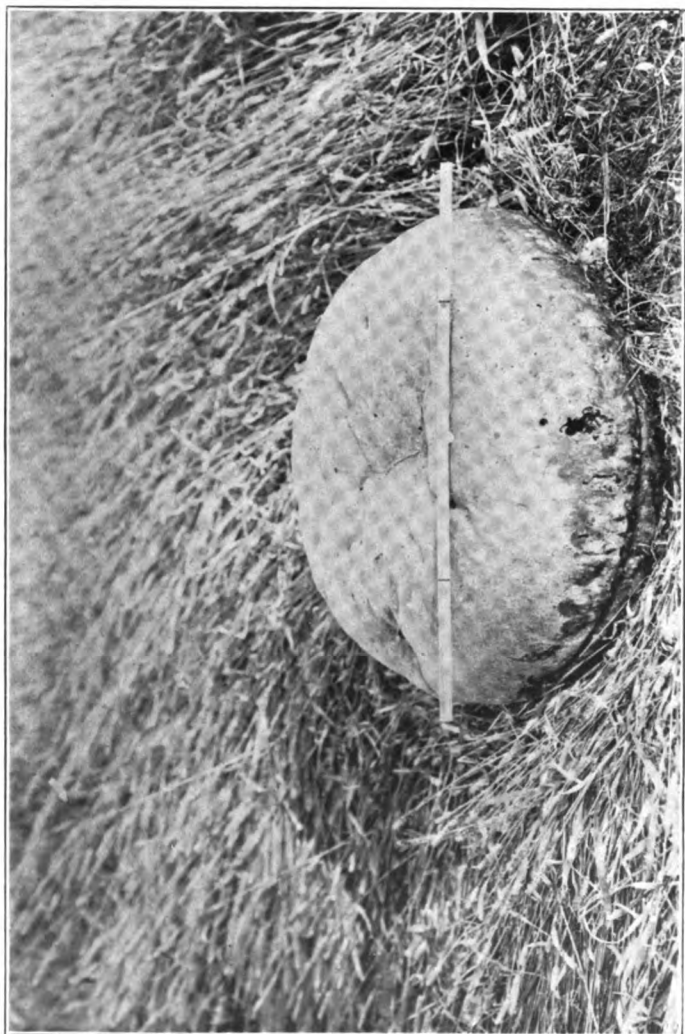
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THE GIANT PUFFBALL.

THE AMERICAN BOTANIST

VOL. X.

JOLIET, ILL., JANUARY, 1908.

No. 1

THE GIANT PUFFBALL.

(*Calvatia Gigantea.*)

IN late autumn and early spring, when other objects of interest are scarce, the papery globes of various species of puffball are likely to attract the rambler's attention. Although often half hidden beneath the withered leaves, they do not long remain concealed, for the slightest touch is sufficient to cause them to send up a smoky cloud that makes their whereabouts known at once. Taken in hand, each specimen appears to be a more or less globular rind enclosing a brownish or purplish woolly mass that gives forth fresh clouds of smoke each time it is squeezed. Well might the superstitious and unbotanical countryman of the olden time call them devil's snuff boxes. In the present day, when a belief in the supernatural connections of plants no longer obtains, the objects are usually called smoke-balls or puffballs.

Although the mature puffball is a familiar sight to most frequenters of the country, there is an element of mystery surrounding its origin that many fail to fathom. The growing plant is so very unlike the ripe specimen that only the initiated are likely to discover the connection between them.

If we investigate the beginnings of the puffball we shall find that it is very much like that of the mushroom or any of the other conspicuous fungi. The greater part of the plant body is below the surface of the soil and consists of white, thread-like strands that ramify about in search of food.

Unlike the common plants, the puffballs have no chlorophyl or plant-green, and in consequence they are unable to

manufacture their own food. They are, therefore, obliged to live on food elaborated by other plants, and a decaying root or moldering log is quite to their taste. In such a medium the fungus strands luxuriate until the plant is ready to produce its spores. Then little whitish buttons or globes filled with closely packed cells begin to appear here and there on the threads and, finally, after a good soaking rain, the tiny cells quickly absorb the moisture and the young puffball expands and appears above the surface of the earth. It is still immature, however, and if broken open has the appearance of an unbaked loaf of bread, the interior being filled with a pure white, cheesy mass instead of the yellowish-brown spores. As the days pass the interior slowly changes in color, first to yellow and then to brown. Ultimately the outer skin breaks open and the multitudes of spores are ripe and ready to fly out in a smoke-like cloud at the slightest touch.

Botanists call the outer rind of the puffball the *peridium* and the cheesy mass within, the *gleba*. At maturity the *gleba* usually turns to a woolly mass in which the spores are entangled. Under a microscope this is seen to consist of fine elastic hairs, to which the name of *capillitium* has been given. The fungus threads that answer to the plant body form the *mycelium*.

There are about fifty species of puffballs in the United States, and any locality is likely to contain several different kinds. By far the largest of these is the giant puffball shown in our illustration. Ordinarily it is from eight to fifteen inches in diameter, but some truly gigantic specimens have been recorded. McIlvaine mentions one from the Eastern States that measured three feet in diameter and weighed forty-seven pounds. Specimens four feet in diameter are reported from Europe. Its specific name of *gigantea* is, therefore, well deserved; in fact, this is probably

the very largest fungus of any kind in the whole world. The specimen from which our plate was made was found in the Forest of Arden by Mr. H. C. Skeels and photographed by Prof. V. D. Hawkins. In the fresh state it measured twenty-three inches in diameter. At present it is deposited in the museum of the Joliet Township High School and is regarded as the largest museum specimen of this fungus in existence. Specimens as large as this are extremely rare, the usual size being seldom larger than a man's head.

Calvatia gigantea usually grows in grassy fields and is found in nearly all parts of the world. It is said to be especially abundant in New Zealand. Most mycologists regard it as rare in America, and C. G. Lloyd, one of our most prominent students of the fungi, says he has seen it growing but once. This does not agree with the writer's experience, however, for he has seen hundreds of specimens growing in certain grassy fields in Pennsylvania, and when a boy found amusement in knocking the soft white globes to pieces.

The greatest interest that attaches to the puffballs in the popular mind is no doubt due to their edible qualities. Among the mushrooms there are certain poisonous species which require great care to distinguish, but this is not true of the puffballs. Thus far not a single poisonous species has been reported. There is a curious passage in Creevey's "Recreations in Botany," in reference to puffballs, that is worth quoting. "The common puffball," she says, "deprives one who has eaten it of all power of motion, while his consciousness still remains, thus producing a sort of terrible trance, resembling death." This amazing statement is likely to amuse those mycophagists who are wont to dine on puffballs almost daily while they are in season.

Some specimens are tougher than others, but all are edible, if collected while the inside is still pure white. The giant puffball is one of the tenderest of the group, and when

sliced and fried in butter makes a most palatable dish. It is likely that in time efforts will be made to grow this plant just as we now grow mushrooms.

Average specimens are commonly too large for a single meal, but if one uses care, enough for a meal may be sliced from the top and the remainder will remain in condition for a long time. Indeed, removing part of the puffball seems to delay the process of ripening. Thus does nature play into the hands of the cook. Somewhere in the account of his travels Marco Polo tells of an ox he saw from which steaks could be cut and new ones would grow to take their places. If he had said puffball instead of ox, his tale would have come nearer to the bounds of possibility.

In the days of flint and steel the contents of a ripe puffball made an excellent tinder for receiving the sparks struck from the flint. It has also been used as a sponge, a styptic and a dye-stuff. At present its only use is a culinary one. If used before the flesh shows the least trace of color, it is a most palatable and nourishing food, being not unlike beefsteak in composition.

OUR ORCHIDS.

BY DR. WM. W. BAILEY.

IN a very general way most people know about orchids. Much has been written about them in general popular literature and in costly illustrated scientific works only accessible in libraries. Travelers have, in their records, incidentally, much to say of them, and their observations are often of value.

For a long time now there has been a craze or fad for orchids that was never equaled in plant history except in the mad seeking for choice Dutch tulips in the late Middle Ages. Daring collectors are out all over the world ever

seeking new kinds. Upon those, fancy prices range easily into thousands of dollars for a single plant.

The most-sought exotics are nearly always air plants or epiphytes, as are also many gorgeous members of the pineapple family (Bromeliaceae). It is the practice of such plants to attach themselves to some other plant, or even inorganic support, from which they derive no nutriment whatever. They are nourished by the air, and possibly by whatever the peculiar spongy roots can obtain from rain or dew. In our finer hot-houses we see them hung in mid-air, attached to bits of cork or in wicker-work baskets, filled with sphagnum. The large pseudo-bulbs of these foreign species at once attract the visitors' attention, as do likewise the twine-like roots.

They are in no sense parasites; they commit no theft, only using neighboring plants for physical support; hence, they are of noble character. Parasitism is never commendable. All air plants are not, then, orchids. The writer often finds a misconception about this. Again, all orchids are not air plants; none of our native ones at the North are so.

What, then, constitutes an orchid? How is 'one to know them?

In the first place, they are monocotyledons or endogens, with parallel-veined leaves, one seed-leaf to the embryo, and stems of the general character of Indian corn, i. e., with no rings. They show also the characteristic numerical flower-plan of their class, the number six, though this is not carried out in full, as in a lily, or tulip, or iris.

In the orchids, one of the six perianth divisions differs essentially from the others, forming the labellum or lip. This is really the upper sepal, but by a twist of the ovary it is in most cases brought to the bottom of the flower. It may be merely fringed or ridged, or it may form a sac, or be hollowed into a bucket. It is frequently made attractive by

brilliant and even varied colors, when it serves, in part at least, as a convenient platform or landing place for a visiting insect on the wing. Sometimes this same sepal is projected backwards, as in the genus *Habenaria*, into a more or less elongated spur or nectary. This contains the fluid sought by insects and so essential to the process of cross-pollination.

The perianth or floral envelope, really the calyx and corolla fused together, coheres with the one-celled ovary, in which the numerous dust-like ovules are situated on the walls. The stamens, one or more, rarely two, in number, are consolidated with the style and stigma, forming the column. The pollen is not powdery, as in most other plants, but agglutinated, as in milk weeds, into pear-shaped bodies (pollinia), furnished at base with a stalk and an adhesive disk.

All the family show extraordinary processes for cross-pollination. This differentiation, for the accomplishment of special important ends, places them, in connection with the marked adnation and coalescence of parts, at the head of monocotyledons, or near it. They form a very large family, widely distributed, but of little direct economic importance. *Vanilla* is about the sole plant of the group that is made use of by man. It must be borne in mind, however, that, owing to the extreme beauty or singularity of the flowers, they are widely sought, and command extravagant prices. Among the most lovely of created objects, it suffices them to be such, so, with compositae, they have been placed among the "royal families" that neither toil nor spin. While the compositae are royal mendicants often, there is no orchid that is not evidently regal; even the common green ones wear a high aristocratic look.

Of our orchids, the lady's slippers are perhaps the most familiar. The showy lady's slipper (*Cypripedium specta-*

bile) is one of our very finest wild flowers. It is pure white, except near the base of the slipper, where it is painted with rich purple. The yellow lady's slippers are nearly as choice, and much more common. The purple or stemless species is the most frequent of all. It grows in dry, sandy districts. In New Brunswick I have observed that it is quite as often white as colored. Is not albinism developed in many species as we go north?

Once upon a time, way back in 1866, the writer had the good fortune to find in New Brunswick two specimens of the rare and beautiful *Calypso borealis*. Years afterwards he celebrated the event in lines to "Calypso, a Rare Orchid of the North," in the New York *Evening Post*. The peculiar effect it had upon him, as something classic and mystical, is sung into that poem, which has often reappeared in orchid literature. To discourage the young from the hope of sustaining the vital spark by verse, the author will add that he never received a cent for it. Stick to prose, young friends, and of that be chary.

A very beautiful, and still rather common, orchid, which, as it is uprooted and sold in great bunches in our city streets, bids fair to ere long disappear, is the *Arethusa bulbosa*. Its leafless stem arises from a bulb, often immersed in peat moss. The solitary flower is of a deep magenta, with a lip fringed with gold and spotted with deep purple and white. It is odorless, and hence easily distinguished from *Pogonia ophioglossoides*, a pretty flower, paler in color, which very closely resembles it. This has a green leaf, too, half way up its stem. Another species of *Pogonia*, dark, livid purple and green in its colors, is found semi-occasionally in dense woods.

Calopogon pulchellus is a beauty, even in its beautiful family. It grows in peat bogs or damp places, and is of a deep, rich magenta, a color of which Nature is fonder than

man. It bears several flowers on a stem, each with an erect lip at the top of the flower. This goes to show that the ovary has not the usual twist of this family.

This article is already too long, or we might go on to enumerate and describe many other of our native plants, the fringed orchids, the maiden's tresses, the coral roots, etc. Mr. Weller's advice in letter-writing is, however, applicable to magazine articles as well. It is best to stop where the reader may demand more, or where one's feeling for the golden rule warns him to do as he would be done by.

Brown University, Providence, R. I.

BOTANY FOR BEGINNERS.—XXII.

ORDER 6—ARALES.

IN the older botanical works the palms and the arums were placed together in a division called the Spadiciflorae, in allusion to the spadix which characterizes many of them. But if we define a spadix as a fleshy spike of flowers, the palms would scarcely have a claim to being included. As a matter of fact, palms and arums are now placed in separate orders, but that they are closely related is shown by the structure of the flowering parts. Practically all of them have their flower-clusters surrounded by a large bract or spathe. It is interesting to glance back over the less highly organized orders of plant life and note the gradual rise of this bract. Among the grasses it is a mere green scale; in the palms it is often large and thick, but scarcely flower-like, while in the arum family it becomes thinner, of various bright colors and curious forms, and so petal-like that the whole flower-cluster, with its enclosing spathe, is often regarded as a single blossom. In reality, this kind of an arum "flower" is comparable with such a "flower" as the daisy, which consists of many small flowers in a head.

The representatives of the Araceae or *Arum* family within our limits are well known to botanists, because of the oddity of the flower-clusters, and when we survey the family as a whole we find that oddity is one of its strong characteristics. Most of the plants are herbs, but there are some shrubby species, and the stem forms range all the way from upright trunks and climbing vines to corms, tubers and rhizomes. These latter forms are well illustrated by such members of the family as the skunk's cabbage (*Symplocarpus*), Jack-in-the-pulpit (*Arisaema*), sweet flag (*Acorus*) and golden club (*Orontium*).

In the climbing species adventitious roots are usually produced and these may be of two kinds, one for clasping the support; the other for absorption. The absorbing roots generally grow downward until they reach the earth, but some species have roots with a spongy epidermis, which absorbs moisture from the air, like certain orchid roots.

The leaves, also, present great diversity of structure and range from long, narrow forms like those of the sweet flag to those of the Jack-in-the-pulpit, in which petiole and blade are sharply distinguished. In an Old World species of *Dracontium* the plant produces but one leaf a year, but this may become fifteen feet long. Curiously enough, although this is a monocotyledonous family, the leaves of most species are netted instead of parallel veined. In various species the leaves and rootstocks contain minute needle-like crystals that penetrate the mouth and throat when eaten and cause intense pain. The corm of the Jack-in-the-pulpit, called Indian turnip, is a familiar instance of this. These crystals are rendered harmless by heat or by drying. The Indian turnip is valued as a cough medicine when dried, and the roots of a tropical species of *Colocasia*, or taro, form the chief food supply of a large number of people.

The typical arum flower-cluster might be described as a fleshy spike, upon which the flowers are closely sessile, the whole surrounded or subtended by a bract or spathe. Often the bract is green, but it may be white, yellow, scarlet or other colors. Frequently it encloses both flowers and spadix, as in the skunk's cabbage; occasionally the tip of the spadix projects beyond it, as in the green dragon (*Arisaema dracontium*); again, it may be so inconspicuous as to seem absent, as in the golden club; while in the sweet flag it is so blended with the scape as to appear like an ordinary leaf. In an African species the spathe may reach a length of six feet.

The flowers, in keeping with the family's reputation for oddity, differ in many ways from the type. They are usually three-parted, as monocotyledon flowers should be, but some are two-parted. Some consist only of stamens and pistils, while others have a distinct perianth. In some, pistils and stamens are borne in the same flower; in others, pistillate and staminate flowers are in separate regions on the same spadix; and in still others, pistillate and staminate flowers are on separate plants. A single species often shows many gradations between these extremes, as for example, the Jack-in-the-pulpit, in which one may find all forms from strictly pistillate to completely staminate flowers, the best-nourished plants being invariably pistillate.

In this group the pistils ripen before the stamens and the flowers of necessity are pollinated by insects. This is also indicated by the colored spathes and spadixes and the strong odors various species emit. The fruit is usually a berry, bright in color when ripe, and in some cases edible. The well-known ceriman (*Monstera deliciosa*) is the ripened fruit of a climbing species common in cultivation.

Most of the arums are plants of the marshes and wet woodlands, and one species, *Pistia stratiotes*, the water cab-

bage of the tropics, is normally floating. There are more than a hundred genera and nearly a thousand species belonging to the group. They are widely spread throughout the earth, but most numerous in warm regions. It is estimated that 90 per cent of the species are to be found in the tropics. The Old World contains the greatest number of species, and it is noticeable that while the family is represented in both hemispheres the different genera are usually confined to a single continent. There are twenty-seven genera in the division of the family to which our green dragon belongs, and fifty species in its genus. *Phellodendron*, a tropical genus, has a hundred species. From this genus a large number of the climbing species come. In the genus *Anthurium* there are two hundred species. The genus *Acorus*, to which our sweet flag belongs, has but two species, one in Japan and the other widely spread in the north temperate zone. Our species is peculiar for seldom producing good seeds. As in other plants that spread readily by underground parts, the production of seed seems to be neglected.

One would scarcely think of putting the little duck-meats (*Lemnaceae*), so abundant on the surface of all still waters, in the same family with the arums, and yet there is where they undoubtedly belong. According to Rendle, they are smallest and least differentiated of seed plants. We can scarcely consider the plant body as consisting of distinct stem and leaves, but if we call the rounded outgrowths leaves, the stem in some species is about one twentieth of an inch long. In temperate regions the plants seldom flower, forming vegetative shoots instead. The flowers are very rudimentary, the staminate flower consisting of two stamens and the pistillate one of a single pistil. Of course such diminutive flowers are self-pollinated. At the base of the staminate flower there is a scale-

like outgrowth which is regarded as a rudimentary spathe. There are but three genera and nineteen species of this group in the world, but they are spread in all waters, except those of the frigid zone. In our own region they grow so abundantly as to completely cover the surface of many ponds.

A MOUNTAIN MEADOW IN CALIFORNIA.

BY MARIETTE POWERS BENTON.

NEVER shall I forget the joy and surprise when one day as we were following a mountain trail it suddenly opened up into a little mountain meadow or cienaga, as the Spanish call it. We had been long absent, as it seemed to us, from our beloved New England meadows. But here, four thousand, three hundred feet above sea level, in the heart of the California mountains, were many of our old-time favorites. Golden-rod! Not once during our exile in this land of flowers (Southern California) had we seen a single plant. Here they were, recalling to our hungry mind the golden splendor of many a vanished autumn. Cardinal flower (*Lobelia splendens*), not a few plants only, but hundreds of large, dark red sprays. So vivid were they that we shut our eyes and opened them again to see if we were dreaming or awake. And, yes, there was one spray pure white. Columbine nodded and danced its cups upon the banks of the little brook. True, they seemed somewhat out of season, blooming beside golden-rod and cardinal flower, but they were none the less welcome. Elder berries shook their tempting bunches of purple fruit above our heads, while clinging to and climbing over everything was wild clematis, that roadside favorite of the Eastern States. But most pleasing of all were the evening primroses (*Oenothera grandiflora*). Many of them yet lingered into the sunshine,

wide open, and fully three inches in diameter. Of course, we could not be content with one visit and so one moonlight night we wandered down to the little meadow again. It seemed like fairyland. Thousands of these evening primroses were swaying in the breeze, many of the stalks as tall as our heads. Almost, we felt we were home once more, but, alas, our eyes wandered to the surrounding hills. They, at least, were truly Californian, showing clearly the sage brush and dried yucca stalks, which in the moonlight seemed like an army of giant ghosts. To the traveler far from home it was a heartsome spot, and we could not see the strange flowers so happy were we with the familiar ones. Southern California, it is true, is a garden of flowers after the rainy season, but to the "Easterner" they are all strange and new, and one has to get acquainted before he can feel at home. So this little mountain meadow, filled with the flowers we had not seen for many moons, gave us more pleasure than the thousands of new strange flowers we had studied and puzzled over in our adopted state.

Riverside, California.

SUBSTITUTES FOR TEA.

TEA, or an infusion of it, is an aromatic drink, more or less astringent and stimulant. It aids the digestion and quickens the circulation by acting on the nervous system and the intellectual faculties. Now other plants have exactly the same qualities as the Chinese tea, but they have the great fault of being much cheaper. Every infusion of a plant that has the same properties as tea will have the same effects; thus the word "tea" has come to signify, in a general way, "digestive beverage," and we shall see that several plants may replace the real tea. One of them has

already won a considerable place as a digestive drink, so much so that instead of "afternoon tea," we may some day have our "afternoon camomile." Everyone knows the camomile and its properties; it is tonic and stimulant, and one soon becomes accustomed to its slightly bitter taste. It is a French flowering plant, *Anthemis nobilis*, and the variety most cultivated is that with double flowers, which is more active than the wild single-flowered type.

What is called "European tea" is furnished by the officinal veronica (*Veronica officinalis*), of very aromatic bitter taste, whose flowering heads are used, fresh or dried, in the proportion of thirty grams to a liter of water [about an ounce to a quart]. "French tea" or "Greek tea" is a plant of Southern France, the officinal sage (*Salvia officinalis*), of strong and agreeable aromatic odor, whose flowering heads and leaves have a pronounced taste, hot and a trifle piquant; its properties are tonic, stimulant, and cordial.

The "Mexican" or "Jesuits' " tea is the product of the ambrosia (*Chenopodium ambrosioides*), a specie of "goose-foot" or "pigweed," an aromatic plant, a native of Mexico, whose flowers and seeds have stimulant properties. "Oswego" or "Pennsylvania" tea comes from a horsemint (*Monarda didyma*), a beautiful plant of American origin, often cultivated in gardens for its beautiful scarlet flowers. Its leaves yield an agreeable tea.

The "Canada" or "mountain" tea, called also "read tea," is the product of the common wintergreen (*Gaultheria procumbens*), whose perfumed leaves are used for this purpose.

The author goes on to cite a considerable number of other shrubs whose leaves and flowers may be used to make a substitute for tea. Among these the only familiar ones are the Paraguay tea (*Ilex paraguayensis*), so largely used

in South America, and the "false tea" (*Lantana pseudo-thea*), employed in Brazil.

It may be seen that there is great choice of plants that may be used for tea; every country has found its own, so to speak, by looking among the weeds that spring up in its own fields. The digestive and stimulant qualities of these teas of course vary with the species, and it is proper to select those that possess them in the highest degree. We incline to believe that the Roman camomile holds first place, but it is easy to try a large number of other teas whose plants may be found in the gardens, for here we must not discuss tastes, and each plant has its own peculiar flavor.—*From an article in American Grocer.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

PINE FORESTS.—In Step's "Wayside and Woodland Trees" we are told that there can be no such thing as a pine forest, for the old German word *forst*, from which our word forest is derived, means pine. A forest, then, is properly an assemblage of *pine* trees.

THE HACKBERRY FOR SHADE.—The editor of *Arboreiculture* recommends the hackberry (*Celtis occidentalis*) as a shade tree. It is a clean tree, free from insects and produces an abundance of berries much liked by the birds.

The foliage is so elm-like that people who go to the woods for their shade trees often dig up the hackberry for the elm by mistake. In the East the hackberry appears seldom to attain great size, but in the Middle West trees eighteen inches or more in diameter are common.

THE WIZARD OF HORTICULTURE.—This magazine does not usually publish poetry, even if paid for at advertising rates, but so many astounding things have been claimed for Burbank in the daily press, that we are tempted to quote the following from *Gardening*:

O, Mr. Burbank, won't you try to do some things for me?
A wizard clever as you are can do them easily.
A man who turns a cactus plant into a feather-bed
Should have no trouble putting brains into a cabbage head.

CORRELATION OF COLOR.—It is a curious result of the correlation of color that red flowers should almost invariably have black seeds. Thus when one is planting mixed seeds of a garden variety having flowers of more than one color, he may select out the red-flowered sorts by the color of their seeds. Black seeds themselves have the red coloring, anthocyan.

THE MULLEIN IN THE WEST.—In the October Note and Comment I saw a note in regard to mullein in the West. I have never seen the plant in Southern California, but on a recent trip through the old mining region about Placerville I observed it frequently. I noticed occasional plants by the roadside, but its favorite place of growth seemed to be hillside clearings in the pine forest, especially where brush had been burned recently. The plants were of medium height, and did not seem to mind the prolonged summer drought in the least. I did not notice any plants below fifteen hundred feet elevation, but above that they seem to be slowly spreading. As near as I could learn from old

residents they have been introduced for a long time, probably ever since '49.—*W. Scott Lewis, Los Angeles, Cal.*

PEDIGREE OF THE EVENING PRIMROSE.—The evening primrose (*Oenothera*) may not belong to the most aristocratic of floral families, but, owing to its usefulness in exemplifying the mutation theory of the origin of species, the pedigree of certain specimens may be traced back for a greater distance than that of other flowers. Some have a known pedigree extending back for twenty years, at least ten generations.

MAKING NEW SPECIES.—It has been found by Dr. D. T. MacDougal that the injection of various substances into the ovary of certain plants will cause the seed in the resulting capsule to produce plants unlike the parent in one or more respects. It may therefore be questioned whether the "sports" that sometimes occur among large numbers of seedlings may not be due to some injury to the ovary while the seed was forming. If the character of the plant can be influenced by stimulation of the ovary, some wonderful possibilities seem within our grasp.

VITALITY OF CATALPA.—In the January number of *Arboriculture* there is a photograph of a long line of catalpa trees that have originated from fence posts. The posts were set with the bark on and immediately sprouted. At present the sprouts are much larger than the original posts. The same magazine is authority for the statement that such sprouting is a common occurrence with this species. Hitching posts, props, and the posts under the foundations of houses when made of this wood are likely to produce new trees. One may thus grow two new fence posts while the original is wearing out, a unique idea in forestry.

Editorial.

Shortly after the October number of this magazine was issued, the printer with whom we have a contract for the work decided to move his establishment to Ashland, Maine, where the numbers for the remainder of 1905 will be printed. As we write, the November issue is in type and the December number will follow immediately. It is not our intention, however, to wait for the completion of these numbers to begin Volume X. We have selected another printing house and this initial number will appear on time. All our present subscribers will receive the numbers to complete the preceding volume, whether they continue as subscribers or not, but we trust that none will fail to renew. The amount of ill luck that has attended our attempt to issue a well-printed magazine on time would be amusing if it were not so serious a matter to subscribers. We take pleasure in noting, however, that during the publishing of the nine preceding volumes, subscribers have received more than we agreed to give, and that we have not attempted to economize, even when the numbers were late, by issuing two numbers in one. This record, we trust, will merit a renewal of your subscription.

* * *

With this issue we send out bills for 1906 with arrears, if any, added. The magazine is sent until ordered discontinued, and, if any do not wish to subscribe for this year, we should be notified at once. Thus far we have found very few who have discontinued after once subscribing. The contents of the magazine attract a substantial, thoughtful class of readers who do not change from one thing to another without good cause. All such will

be glad to know that the magazine for 1906 will follow the usual standard. The articles on the flowering plant families will be continued, a frontispiece will appear in each issue, and the Note and Comment department will remain an important feature. We solicit a continuance of contributed notes and longer articles from our readers.

* * *

Look over your files and if any numbers are missing later than Volume VII we shall be glad to supply them free. We can no longer make this offer for the earlier volumes, because recent orders have so reduced our stock that no single numbers are available. If any reader of this magazine has not a full set of the back numbers, he will later regret that he did not secure them while he could. A large proportion of our new subscribers order full sets from the beginning. This is especially true of libraries. If you do not care to own a full set, ask the nearest library to order one, so that you can refer to it when desired. When our stock is gone it will be too late.

* * *

Last autumn *The Garden Magazine* announced that it would soon give a gold medal to the cultivator who first showed that it was possible to grow fringed gentians from seed. Upon receipt of this notice we at once claimed the prize for Mr. J. Ford Sempers, of Aikin, Md., who raised the plants from seed five years ago, and whose observations on their germination and growth have appeared at various times in the AMERICAN BOTANIST. In spite of this, the prize went to Mr. Thomas Murray, of Tuxedo Park, N. Y., whose experiments did not begin until a year later than Mr. Sempers', and whose published results did not appear until December, 1905. In fact, the successful work of Mr. Murray was not begun, as appears from his account, until

1908. The pretext for ruling out Mr. Sempers' claims was that he had not published full cultural directions. It is noticeable, however, that at the time Mr. Murray was awarded the medal he had published no cultural directions whatever. The whole medal performance, therefore, has the semblance of a magazine presenting bouquets to itself merely for advertising effect. The medal is inscribed, "For raising fringed gentians from seed." Nothing was said about cultural directions until our candidate appeared. If *The Garden Magazine* has any more medals to give away we venture that the editor will look carefully through the files of AMERICAN BOTANIST before committing himself.

BOOKS AND WRITERS.

After Dr. J. M. Coulter's "Plant Relations" and "Plant Structures" had been issued, the two were combined in abridged form to make a volume called "Plant Studies." This latter volume, worked over and rearranged, has now appeared as "A Text-book of Botany." The book begins with a study of leaves and runs on through stems and roots to the germination of seeds. Then begin studies of typical plants, to illustrate the principal plant groups, and the book ends with chapters on plant breeding, forestry and plant societies. In the opinion of the reviewer the latter half of the book is by far the better. The work, however, is very well done and the book is likely to retain the place its predecessor made in the estimation of teachers of botany. There is an abundance of good illustrations that help greatly in elucidating the text. (New York, D. Appleton & Co., 1906.)

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A MONTHLY JOURNAL FOR THE PLANT LOVER

ISSUED ON THE 15th OF EACH MONTH

WILLARD N. CLUTE

EDITOR

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SKUNK'S CABBAGE—*Symplocarpus foetidus*.

THE AMERICAN BOTANIST

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No. 3

OUR NATIVE ARUMS.

THOSE who take their botany as a recreation, rather than a business, commonly do not care for the nice distinctions that employ the scientist. They shun the grasses and sedges, with their hundreds of species difficult to separate, and look with more favor on the buttercup, heath and lily families, where most of the species are so distinct and clear-cut that after one has identified his plant there comes no disquieting afterthought to suggest that possibly after all it is not the species he thinks it is. Your ordinary flower-lover wants no puzzles among the plants; no species that must be sent to the distant scientist to be verified. As well stay in the house and study geometry as to go afield and study the modern *Crataegus*. It is well indeed to know all the minute differences among the plants—the scientist is entitled to our honor and admiration—but for a botanical holiday we turn to the plants whose bright hues, pleasant fragrances or strange shapes attract attention and make the naming of the specimens easy.

A further attraction attaches to those families that are few enough in numbers to warrant the hope that we may eventually collect them all. There is great satisfaction in completing some department of our knowledge; in writing finis to some special undertaking. No doubt these considerations have something to do with the interest the beginner takes in the Arum family, though the curious shapes of the flowers, unparalleled by other plant families of our acquaintance, may also act as a contributing cause.

In most of the Northern States this family has the honor of furnishing the first spring flower. While yet the maple-

buds are unmistakably only buds, and the hazel catkins have shown no signs of relaxing, while pussy willows are still far from showing flowers, this firstling of the year, this leader of the vernal carnival, pushes up its spotted hood by swamp and stream and bids the milder season welcome. Lacking the fragrance of the arbutus or the delicate beauty of the hepatica and dubbed with an offensive name, the skunk's cabbage (*Symplocarpus foetidus*), lays no claim to a favorite's place, but thrives none the less lustily among the greening rushes, giving the first pollen to the bees and the hope of spring to the early Rambler. Sometimes, in the latitude of New York, the first flowers appear by the middle of February. These are favored individuals, growing where the living waters of some nearby spring keep the ground unfrozen through the winter, but shortly afterward every swamp is dotted with the pointed spathes. No one can mistake the purple-spotted, shell-like flower-cluster, just peeping above the mud and water. As they commonly grow they appear stemless and un-flowerlike, but if by chance they push up under water they may develop a stem several inches in length, when a decided likeness to their regal relative, the calla lily, is seen. It is generally supposed that the flowers have a strong and fetid odor, but this is incorrect. It is only when leaf or stem is bruised that any odor is noticeable.

Though often found in bloom surrounded by water, the skunk's cabbage usually does not grow in places that are inundated the season through. Its habitat ends near the line of standing water, but just beyond appears an ally, the water arum (*Peltandra undulata*). Its arrow-shaped leaves rise above the water in thick clumps, while below them on long stems the slender, green, pointed spathes enclosing the flower-clusters spread about. No ordinary flower-gatherer considers this so-called flower worthy of a place in a bou-

quet and one looks in vain in the popular handbooks for a description of it. If the manuals had their way it would be common in most of the states east of the Mississippi, but it appears to be by no means a common plant. As the berries mature this species has the curious habit of bending the spathe downward until the tip reaches the mud, where it decays and probably sets the fruits free. In the South Atlantic States another species, *Peltandra alba*, with a white spathe, is found. Otherwise it is much like its relative.

It is noticeable that all our species of this family show a preference for a watery habitat. Those that are least influenced in this direction are the Jack-in-the-pulpit (*Arisaema triphyllum*) and its relative, the green dragon (*A. dracontium*), but we all know how the first loves a moist, rich spot in the woods, and how inclined the dragon is to haunt the banks of streams. No one needs a description of Jack-in-the-pulpit. The purple-and-green streaked spathe drooping over the erect spadix is familiar to every child who has even a speaking acquaintance with the spring woodlands. As Indian turnip, the underground parts have served as the basis of many a school-boy's practical joke. It is almost worth anybody's while to carefully nibble this pungent corm by way of experiment. It should be tasted, however, not chewed. One may be duly impressed with its powers with a very small amount. Many tropical species have similar properties.

One may well wonder how the green dragon got its name. There is nothing dragon-like in its appearance, though the long, slender, green spadix, too long for the spathe, and therefore projecting some inches beyond it, gives the flower-cluster a bizarre look that must attract the attention if it does not compel the admiration. It needs no further note to distinguish it from the more familiar species, though if this were necessary the single leaf, curiously

divided into from five to seven leaflets, would quickly separate it from the trifoliate leaves of Jack-in-the-pulpit.

Although the inflorescences of this family are well known to consist of pistils and stamens seated on a thick stalk or spadix and the whole subtended by a bract or spathe, it is customary to speak of the whole flower-cluster as a single flower. In this sense the flower-clusters of the wild calla (*Calla palustris*) come nearest to deserving the name. The spathes are whitish, flat or spoon-shaped, and are fairly like those of the cultivated calla, which, by the way, is not a *Calla*, though it does belong to the arum family. The leaves also resemble the cultivated plant. The wild calla delights in the more watery parts of open swamps, where it may spread out its spathes to the sun. It is nearly always to be met with in suitable situations and is found in Northern Europe and Asia also.

The sweet flag, or calamus root (*Acorus calamus*), is another product of wild nature which is considered desirable treasure by school-boys, but it may be doubted if in digging it up its relationship to the Indian turnip ever occurs to them, though its warm, aromatic flavor might give them a hint. It is the most un-arum-like of its race, with long, narrow leaves like those of the cat-tail or the blue-flag. Indeed, the common name of sweet flag seems to have been given our species to distinguish it in the popular mind from all other flag-like plants. Its flowers are seldom seen, though they are not rare, because they are colored exactly like the leaves; or, if seen, they are not recognized because so little like flowers. There is no spathe, at least nothing at first glance that looks like one, and the cluster of flowers, like a stiff, green cone, seems to spring from the side of one of the leaves, about midway from base to tip. A closer look, however, convinces us that this leaf-like affair is really a spathe, which is continued beyond the flower-cluster.

After all, a spathe is morphologically a leaf, so why should it not be green and flat upon occasion? The spadix, with its cluster of flowers, is also edible, and has the same pungent flavor as the root, but in lessened degree. The seeds are said to be usually defective, as they often are in plants with other means of multiplying.

Rarest and most curious of all its tribe in our region is the golden club (*Orontium aquaticum*), which delights in sphagnum bogs and the muddy borders of small lakes, where it thrives in several inches of water. It will be recognized at first sight by the slender, club-like spadix, green at the base, white above, and tipped with bright golden yellow. In vain one looks for a real spathe. At the base of the club is a papery sheath that receives the name, but it plays no part in the flower-cluster, as do the spathes of all our other arums. The leaves are spoon-shaped and when growing in water rest upon its surface. The seeds are edible and are said to have been used by the Indians, who boiled them much as we do peas. This fact may account for the peculiar distribution of the plant. It is found usually near the sea coast from Massachusetts to Louisiana, but also occurs irregularly inland. In these latter situations it is often very abundant, and it is conjectured that such places were planted by the Indians with an eye to their food value.

BUDS.

BY DR. WM. WHITMAN BAILEY.

BUDS well illustrate the ignorance of people about common things. Persons who would look surprised and grieved because we confessedly know nothing of the integral calculus and have misty ideas of a great many things not too evidently ethical that occur in business, will yet ask

strange questions about objects one would suppose them to have known since childhood.

Almost every year, in January and February, we have a few buds of horse-chestnut, hickory and Norway maple for study and pleasure. The delight may be combined with study, or it may be apart from it entirely; but the study is sure to bring delight, while the joy may lead to further investigation. Often a person of so-called liberal culture will salute us with the remark, "Why, how forward those buds are. A friend of mine saw trailing arbutus in bud the other day. It is going to be an early spring, is it not?"

Now, as a matter of fact, the buds in question and those of elm and a number of other plants, have been in just about the same condition since last August or even earlier. Few people ever look at them. What's the use? They will take care of themselves just as well as if we knew all about them. True, as regards the buds, but it may be our soul's salvation would be safer for a glance.

From a purely practical point of view—and it is the "practical" that is eternally dinned into a botanist's ears—one never knows how soon an observation made in the secret of the closet or laboratory may become of value in the market-place. My own father, studying diatoms and other microscopic organisms for the delight their beauty gave him, was one day called upon by the United States government to investigate the mud from the Atlantic floor to prove whether such a bed was able to bear the telegraph cable. Professor Huxley on the other side and Ehrenberg did the same. These quiet savants suddenly became important. So Louis Pasteur probably little foresaw to what his early researches would lead in the cure of disease or mitigation of human suffering or in the saving of so important an industry as grape growing.

To return from a long digression, buds are young shoots or branches. They may contain foliage or flowers or both, but always they belong to the stem and leaf features of the plant. This, their position, either terminal or axillary, determines; also their structure when dissected. Nothing, by the way, can be prettier than the interior of some buds. Take, for instance, that of the horse-chestnut. Outside it is covered with glutinous scales to turn water which, getting under them if unguarded, might freeze and rend the bud. Right here I am often asked by college students: If this is such an excellent plan, why do not all buds exhibit it? I usually anticipate by saying in a casual way that each plant has its own problems to solve; and what is good for one is not, perhaps, good for another. In briefer form, I own up squarely that I don't know. Good Professor D. C. Eaton, of Yale, told me early in my career as a teacher never to pretend I knew what I didn't. "The student is sure to catch on!" With his words dwelling in my memory I have avoided many sloughs.

After removing the outer sticky scales of our horse-chestnut, we find the subsequent foliar bodies more and more leaf-like, till, finally, we reach the true leaves—seven-fingered, woolly leaves, neatly folded and packed away. Sometimes we will discover in addition the inflorescence resembling a minute cauliflower, which itself is nothing but a mixed bud, never advancing beyond the bud condition. One hates to disrupt these little folded hands. How securely nature has packed them away!

Take, again, beech buds, long, tapering lance-points. The leaves within are things of rare beauty, delicate to evanescence and clothed in the costliest silk. In some buds, horse-chestnut or other, we will find in miniature the whole inflorescence of the year. The microscope reveals, in the tiny buds, what parts of the flower are formed first and the

consequent succession of organs. Youth is always interesting, babyhood even fascinating to the roughest of mankind. It is hence with peculiar gentleness that we handle these infantive buds. From them may issue the sinuate leaf of the oak, the lobed or jagged blade of the maple or the little fingers of the horse-chestnut, held out in blessing.

Providence, R. I.

BOTANY FOR BEGINNERS—XXIV.

ORDER 8—LILIALES.

IN tracing the development of the monocotyledons from their simplest forms it is rare that we find flowers with all their parts so clearly distinguished that the ordinary observer can recognize them until we reach the Liliales. There are, to be sure, indications of what is to come, for down in the scale, as may be instanced by the arrowheads among the Naidales, but for the most part the flowers are too little like ordinary flowers to be individually distinguished. Often, indeed, as in the grass family, the flowers are so inconspicuous that they may pass unnoticed, but with the advent of the lilies and their allies we find large, distinct and brightly colored flowers in abundance.

There are nearly five thousand species in the lily alliance arranged in from six to nine families according to the tastes of the botanist who does the arranging. Of these families the bunch-flowers (Melanthaceæ) and blood-worts (Haemodorum) are small and not especially conspicuous. The smilaxes (Smilacaceæ) are easily distinguished by their climbing stems and net-veined leaves. The lily-of-the-valley family (Convallariaceæ) was formerly placed among the true lilies, but has been separated from the rest because of its berry-like fruits. The yams (Dioscoreaceæ) are closely re-

lated to the amaryllis family, but may be distinguished by their climbing habit and dioecious flowers.

The four chief groups of the lilyworts are the rushes (*Juncaceæ*), the irids (*Iridaceæ*), the amaryllids (*Amaryllidaceæ*) and the lilies proper (*Liliaceæ*). The ordinary observer would scarcely place the common bulrush and its allies among such regal plants as lilies and irises, but that is certainly where it belongs, as may be easily seen by a glance at the flowers. It is true they are not much like the flowers of lilies in size and color, but in shape and structure they are exact little brownish or greenish lilies. So true is this that certain genera on the border line between rushes and lilies may be placed in either group without offending the proprieties. The iris family may be distinguished by the fact that the flowers have but three stamens and the ovary is below the rest of the flower. In the lilies and amaryllids there are six stamens, but these two families may be easily separated by the fact that in the former the flowers are hypogynous; that is, with the floral parts springing from the base of the ovary, while in the latter the flowers are epigynous, as in the irises. The species of amaryllis are usually called lilies, but if one wishes to distinguish between them a glance at the flower arrangement will settle the matter.

The plan of the flower is, of course, the same throughout the order. It consists of a perianth of two whorls, but with the parts so nearly alike as to appear like one circle, one or two whorls of stamens and a whorl of carpels. The number in each whorl is three. The perianth is usually not to be separated into calyx and corolla upon the basis of color, for the two whorls are commonly colored alike; yet in the trilliums the outer whorl is green and sepal-like, and in most of the others the three outer perianth segments are slightly larger or coarser, as if foreshadowing the typ-

ical flowers of Dicotyledons. In many species we may still find traces of the bract that enfolds the flowers of the lower Monocotyledon orders, as in the Amaryllids, where the flower buds are often enclosed in such a bract. In the Japanese species of *Rhodea* the small flowers are borne on a spadix not unlike that of some Arums. Mention should be made, also, of the peculiar outgrowths from the perianth of various Amaryllids, as in the narcissus and jonquil, where it forms a cup.

In general, the flowers of this order are large, and by their color, nectar and perfume indicate that they are pollinated by insects. Nectar is secreted at the base of the ovary or in special grooves lengthwise of the perianth segments. In the majority the flowers are regular and the nectar accessible to a variety of insects, but in the iris family and many of the Amaryllids the flowers are zygomorphic and adapted to certain insects only. In connection with one of the Amaryllids, a most remarkable case of symbiosis with an insect has sprung up, in which a moth (*Pronuba*) lays its eggs in the seed capsule of the yucca, and then to insure that the young seeds will develop and form food for its larvæ, deliberately gathers the pollen and places it on the stigmas. Only a few of the seeds form food for the larvæ. the rest maturing. It is said that in regions from which this moth is absent the yucca does not mature its seeds. The irises, also, show great specialization for cross-pollination, and by an arrangement of stigma, style and sepal, manage to secure the attention of insects in just the right way to effect these ends. On the other hand, the rushes are practically all wind pollinated and are therefore actinomorphic, small and dull in color. Among the lilyworts we find a large number of delightful perfumes, but there are other members of the order, for example, the carrion flower (*Smilax*) and some of the trilliums, whose odors can be de-

scribed only as stench. These odors attract flies, and the flowers are thus as effectively pollinated as any.

There are many things about the vegetative parts of this group that are of interest. For the most part, the leaves are long and narrow (linear), but many broad-leaved forms are known. Although this is a typical Monocotyledon family, some of the broad-leaved forms are net-veined, as in the yams and smilaxes. The great majority are herbaceous perennials, but a few like *Dracaena* and *Yucca* are shrubby or tree-like. The herbaceous species are mostly geophilous with the intermittent life-habit; that is, the main stem is underground in the form of a corm, bulb or rootstock. Into these underground parts the plants seem to retreat whenever danger above ground threatens. In our own region the danger is usually from cold, but in other parts of the world it may be extreme heat or drouth. In these underground parts a considerable food supply is stored, allowing a rapid development of the parts above ground when a favorable season returns. Man has taken advantage of the plants' providence, and regularly uses the food store of some species, as the yams and onion. Saffron comes from one of the iris family, asparagus, aloes and squills from the lily family. Sarsaparilla is obtained from one of the smilax family. The Liliales, however, are valued more for the beauty of their flowers than for their edible qualities.

The fruits of this order are either dry capsules or berries. The species with capsules have no very specialized methods of seed distribution, and the species seldom extend over very wide territory. Those with berry-like fruits, adapted to dispersal by animals, have a much wider distribution. The order, however, is represented nearly throughout the world, being very common in regions where xerophytic conditions prevail.

GRAPE FRUIT AND SHADDOCKS.

THERE is little doubt that much confusion exists as to what is really grape fruit, as distinct from the allied citrus fruits passing under such names as pumelow (invariably spelled pomelo in the United States), shaddock, forbidden fruit, paradise fruit, and others. These fruits are all, or nearly all, larger than the largest orange, and they are uniformly of a pale-yellow color. In texture the rind may be smooth or even polished. It is seldom rough, nearly always firm and not very thick. The pulp is pale-yellow or greenish-white, sometimes pink or crimson. The juice bags of the pulp are more distinct than in the orange and very juicy, somewhat sweetish, with a distinct but agreeable bitter flavor. In shape these fruits vary a good deal. Some are quite globular, others somewhat flattened at the top and tapering below, forming a pear-shaped body.

These fruits have been ranged under the giant citrus (*Citrus decumana*). This is supposed to be a native of the islands of the Pacific. It was introduced into the West Indies from China about 150 years ago by Captain Shaddock, in compliment to whom, since that time, the fruit has always been known in this part of the world as shaddock. The term shaddock may be correctly applied to any of the larger members of the giant citrus. The word pumelow, so widely used in India and Ceylon, is supposed to be a contraction of *pomum melo*, the melon apple.

All the larger-fruited sorts may, then, be called either shaddocks or pumelows; these are merely the Western and Eastern names for the same thing and are perfectly interchangeable. There are two well-marked varieties, one being globose, with the flesh of a pale-pink color, and the other pear-shaped, usually with a deep-pink or crimson pulp.

As regards the small-fruited sorts, these, according to Dr. James Macfadyen, the author of the "Flora of

Jamaica," may be either globose, when they are called forbidden fruit, or pear-shaped, when grape fruit (so-called because the fruits grow in clusters like a bunch of grapes) is the older name. The name forbidden fruit (from a fancied connection with the Garden of Eden) is tolerably old in the West Indies.

As usually happens, when a name has become familiar in commerce, it is eventually applied in a much wider sense than the original one. Thus, the term grape fruit has become so general that any moderately large fruit, provided the skin is pale-yellow, thin and smooth, and the pulp of a delicate flavor, is designated by it. The fruit commonly called grape fruit in New York is really the forbidden fruit of the West Indies. The true grape fruit is pear-shaped, and, according to Macfadyen, when obtainable at its best, is preferable to the forbidden fruit. The latter are in great demand, and they are regarded as the most refreshing and wholesome of any of the citrus family.

The grape fruit is not a shaddock nor a pumelow. It is quite a distinct fruit and possesses exceptional merits. It is in great demand in America, chiefly because it has been so highly recommended by the medical faculty for its valuable dietic and tonic qualities. It is also very refreshing and is regarded as a specific for dyspepsia.

There are, doubtless, many inferior sorts of grape fruit. In fact, in the West Indies, the plants have been allowed to run almost wild. No care has been taken to select the best varieties, or to bud or graft them so as to keep them uniformly at a high standard. There is no need to grow the thick-skinned and bitter sorts and those with a dry, cottony pulp, while there are varieties, both of the apple-shaped and pear-shaped fruits, with a silky skin, full of juice and of almost delightful flavor and with just enough bitter to give it piquancy and suggest its valuable tonic qualities.—*Indian Planting and Gardening.*

YERBA MATE OR PARAGUAY TEA.

THE plant from which yerba mate is produced is a species of holly, *Ilex Paraguayensis*. Last year not less than 35,000 tons were exported from Brazil and Paraguay alone. The common name of the beverage is Paraguay tea, although the use of the word tea is obviously incorrect.

The principal varieties of yerba are grown in Argentina, Paraguay and Brazil. The Paraguayan plant is the strongest, has the richest flavor, and commands the highest price. Next in quality is the Argentina yerba, grown only in the province of Las Misiones. It is steadily improving in quality, but the output is small and falls far short of supplying the demand. The yerba grown in Las Misiones is of three varieties: Yerba morada, with violet-tinted, dark-green, oval leaves, six to eight inches long and three to five inches broad, produces a very bitter and inferior quality; yerba blanca, conspicuous for its whitish dark-green leaf about half as large as that of the morada; and yerba caa-mi or amarilla, with a leaf of slightly yellowish color, and one and a half to two and a half inches long. This supplies the best of the native yerbas, although it is surpassed in quality by some varieties of the Paraguayan and Brazilian plantations. Brazilian mate, the cheapest of all, is produced in the greatest quantity, but is not so rich in flavor as any of the others.

Yerba mate is a mild stimulant and is also highly nutritious. In some parts of South America it constitutes nearly the whole sustenance of field laborers, who often drink ten and twelve cups daily. It has none of the bad effects of alcoholic liquors, and its use is therefore being strongly encouraged from the humanitarian and sanitary standpoint. It is also much more easily prepared for mar-

ket than coffee, the whole operation not lasting more than thirty-six hours.

The full-grown yerba plant is usually about the size of an orange tree, though it sometimes grows as high as twenty feet, with a trunk measuring over three feet in circumference. Its leaves are described as perennial, rather thick and coriaceous, with strong mid-ribs. The trunk and branches have a somewhat velvety appearance, due to a fine, fuzzy growth on the bark. The flowers are small, white and four-parted. The fruit is red, about the size of a grain of pepper, and contains four very hard-coated seeds.

The harvesting of yerba includes gathering both leaves and twigs. The first crop is taken when the plants are four or five years old, care being had not to remove more than one-fifth or one-fourth of the leaves from each tree. At six or seven years of age the crop from each plant should average sixty to eighty pounds, including uncured leaves and twigs. Even good-sized branches are often harvested, as the crop can thus be much more quickly gathered than if only the leaves are picked, although the woody parts impair the quality of the beverage, and, indeed, the best kind is made from selected leaves only. Yerba of this grade, however, is not found in the general market, as its cost is several times greater than when twigs and small branches are included in the gathering.

The beverage is given one of four names—"mate amargo," having a bitter taste; "mate dulce," sweetened mate; "con leche," when prepared with milk, and "cocoa mate," if mixed with cocoanut.—*From an Article in Tea and Coffee Trade Journal.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

TROPICAL TREES.—“In an ordinary temperate forest,” writes Dr. Francis Ramaley in *Popular Science Monthly*, “the number of species of trees can almost be counted on the fingers of two hands. The species in a Northern coniferous forest might be counted on the fingers of a single hand. In a West Java forest there may easily be fifty species of trees within a distance of as many feet from an observer. In the whole island of Java there are probably a thousand different kinds of arborescent plants—perhaps more.”

SPHAGNUM AND LIME.—The peat moss (*Sphagnum*) is so abundant in many parts of the world that it fills immense bogs, and its dead stems, mingled with other vegetable debris, form layers of peat many feet in thickness. In other parts of the world, however, the peat mosses are unaccountably absent, and it has been conjectured by botanists that their absence is due to large amounts of lime or other mineral salts in the water. This has been tested by E. N. Transeau, who finds that peat mosses, contrary to the general impression, are not prevented from growing by such mineral salts.

THE WATER-CRESS GENUS.—There are people who think that the water-cresses are still to be found in the genus *Nasturtium*, but for some years they have been masquerading under the name *Roripa*. This latter name was given to the plants in 1760 and quite forgotten until a botanist

dug it up out of the limbo of antiquity about one hundred and forty years later. A few followed this leader and called the plants *Roripa*, but they had their trouble for nothing. Another botanist has now found a name given four years earlier and the world is asked to call the plants *Radicula*. Why not call the whole proceedings *Ridiculous* and be done with it?

SEED DISPERSED IN THE CONIFERS.—There are two misconceptions prevalent about the conifers. The first is, that all plants belonging to this group are evergreen, and the second, that all bear cones. The larch or tamarack (*Larix Americana*) is a good example of one of these “evergreen” trees that is not evergreen, and the cypress (*Taxodium distichum*) is another. The behavior of this latter tree is the more surprising, since it is an inhabitant of the South and apparently not obliged to cast its leaves in autumn, as are the broad-leaved trees farther north. Not content with dropping all its leaves, it often drops some of its young twigs as well. All the trees belonging to the group are cone-bearers, at least by courtesy, though the fruits of some are as little like cones as they could be. That of the yew appears like a fleshy red drupe and the berries of the juniper are well known. In these cases the fruit is modified for distribution by birds or other animals. In the trees that bear cones of the familiar form, the seeds have a wing-like expansion of the seed-coat that aids their distribution by wind. The erratic cypress has still another method. Its cones are small, spherical, composed of very few scales, and fall to pieces at maturity. The seeds are surrounded by a thick, cork-like layer, which is apparently designed as a float for distribution by water, and the early breaking up of the cone thus facilitates the process. Since the cypress grows in marshy places or in standing water, this adaptation for distributing the seed is a most successful one.

Editorial.

Those who find this magazine helpful in its present form will no doubt be interested in the result of the invitation that was extended to critics in the February number. A good share of those to whom the marked copy was sent replied, and from these letters we feel that we have now gained a glimpse of the magazine from the point-of-view of the non-subscribing applicant, at least, that will be most helpful to us in planning future issues. The letter which, all things considered, we regard as the best, was written by Frank R. Miller, R. D. 3, Toledo, Ohio, and the second best was sent by D. A. Bright, Larned, Kas. To both of these gentlemen the magazine will be sent free for 1906. Mr. Miller also has the privilege, if he chooses, of obtaining all the back numbers for \$2.00, and Mr. Bright has a like privilege at the \$3.00 rate. To all other critics a copy of the present number will be sent.

* * *

One of the greatest surprises we received was the statement in almost every letter that the magazine is too technical! One of these critics, at least, is a graduate of a well-known university, but it is possibly needless to say he was not in the scientific department. All this time we have been flattering ourselves that this is the most untechnical magazine that ever happened, and now the public rises up and asks us to be more intelligible! We fail to see yet how we can become more so without dropping into words of one syllable. It begins to look as if botanical literature, even of the popular sort, has a dialect all its own which is but jargon to ears unaccustomed to it. Those who read and *do* understand may begin to realize the select company they are in.

Nearly all our critics, also, asked for assistance in breaking into the charmed circle about the goddess Flora. "Give us," say they, "more articles by which we may discover the names of the attractive flowers in our own woods and fields." To this we might reply that the magazine was started principally with a view to providing information for those who have passed the identification stage in botanical work, but there seems to be so great a demand for articles about the showy wild-flowers that hereafter we plan to have at least one article of this kind in each issue. It may be remarked in passing, also, that the series of articles on "Botany for Beginners," if read thoughtfully in order *from the beginning*, should place the reader in a position to understand at least the major part of what now appears in the publication.

* * *

After all, who is there among us that understands all he reads on even his own line of research? I do not question the mere understanding of the words, but that deeper understanding that takes and makes each idea or fact its own. One may read volume upon volume of descriptions of a plant, and see pictures in plenty, yet when he finds it, it does not fit the mental image previously formed. Nor does the mind readily take up unrelated facts. We must first have a peg to hang our information upon. As we advance in knowledge, facts that we have read and forgotten take on new meanings and become alive. Thus a second reading of a book or a glance through the old numbers of a magazine brings out beauties that we never realized were there.

* * *

Those who expressed any opinion on the subject, favored more note and comment at the expense of the longer articles. We hope our readers will all make note of it! There is probably not a week goes by in which every plant

student does not find something worth writing about; something which he would be sure to mention if we could go herborizing with him. A short note on the subject would add much of interest to our department, we are sure.

* * *

The November number of this magazine has been printed for at least six weeks, but has not been sent to subscribers for the very good reason that the postal authorities are still trying to make up their minds where the issue can be mailed. Our change in the mailing office seems to have completely upset their calculations. As soon as we receive a decision subscribers will receive their copies. Meanwhile the December number is in type and the printing and binding will not delay it much longer. It will doubtless be out in time to be mailed with the other number.

* * *

Our London contemporary, *Gardening World*, has issued free to its subscribers their "Handbook No. 1," which describes the fifty best roses for British growers. The handbook is written by the editor, John Fraser, F. L. S., F. R. H. S., and besides describing the plants gives full cultural directions and illustrates a large number of them. We are also indebted to this enterprising publication for a copy of their excellent pocket diary for 1906, which, in addition to giving ample room for daily memoranda, contains considerable other information of value to the gardener.

The Great Lakes Botanical Club has been founded by A. B. Klugh and a number of other botanists, for the study of botanical problems related to the region of the Great Lakes. At present the work will be carried on by a circulating bulletin to which all the members will contribute.

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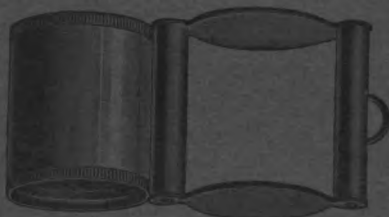
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EDITOR

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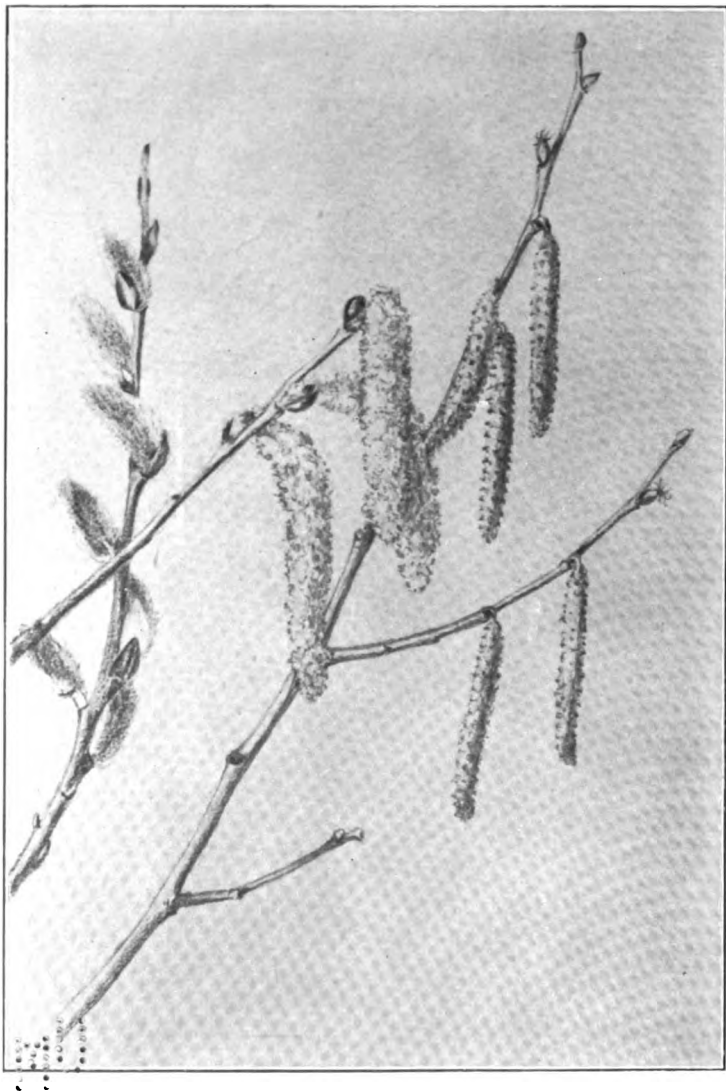
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CATKINS OF WILLOW, ASPEN AND HAZEL.

THE AMERICAN BOTANIST

VOL. X

JOLIET, ILL., APRIL, 1906.

No. 4

OUR AMENTACEOUS PLANTS.

THE amentaceous plants form a large part of our spring flora, though in but few instances can it be called a conspicuous one. With the exception of a few plants like the pussy-willow and the alder, the flowering parts are so little like ordinary blossoms that the casual observer rarely notices that they are in flower, and the botanist, himself, is usually not so familiar with them as he is with the more conspicuous members of our flora. Many people have an idea that several of these plants in some unexplained manner, bear fruit without the preliminary process or flowering. The average man is always surprised to learn that oaks bear flowers.

There are several reasons why these plants attract no more attention than they do when in flower. In the first place they have no showy petals or sepals to catch the eye, and the essential organs, the pistils and stamens, are usually greenish or pale yellow like the opening leaves. When these organs take on bright hues, as they do in the chestnut, willow and cottonwood, they at once become noticeable. Again, the size of the individual flower makes them very inconspicuous. It is only by being assembled in spike-like groups, called catkins, that they attract any attention at all. The catkin may be said to be the badge of the order. It varies with the species, but in all it is essentially a slender axis along which many flowers are clustered. These flowers are rarely composed of both pistils and stamens; usually the pistils are in one group and the stamens in another. Sometimes, as in the hazel, the two kinds of flowers are on different parts of the same plant; again, as in the

willow, the two kinds are on separate plants; and in others, like the chestnut, the pistillate flowers are clustered at the base of the staminate ament. The pistillate flowers in nearly all our species exhibit a tendency to be grouped in very short, few-flowered spikes. The staminate flowers are the ones that usually form the real catkins. If one will examine a single scale from one of these catkins he will find that it bears several stamens on the upper surface. The number and arrangement varies with the species, but in all, the stamens greatly outnumber the pistils and a great amount of pollen is produced. This abundant pollen is necessary to ensure pollination, since the wind is depended upon as a carrier. For the same reason most of the species bloom early in the year, before the leaves have appeared to prevent free circulation of the pollen-laden air.

The amentaceous trees are not abundant in the tropics, but the bulk of our arborescent flora is made up from this group. Among the plants that belong to it are the oaks, willows, birches, poplars, alders, hazels, hickories, walnuts, ironwoods, chestnuts, beeches, bay-berries and sweet-fern. The various groups may be distinguished by their blossoms, but other characters are often necessary for the identification of the individual species; in fact, the willows are among the most difficult of plants to name satisfactorily. The oaks and various others are best identified from their fruits, but most of them can also be recognized by their leaves and bark alone.

OUR VIBURNUMS.

BY DR. WM. WHITMAN BAILEY.

THE other day I was much surprised to receive from a lady in Foster some very fine specimens of *Viburnum lantanoides*. I had never seen it before from our own

state, although I had known of it as being found near Wal-lum Pond.

This plant, variously known as hobble-bush and way-farer's bush, is the most beautiful, on the whole, of its very lovely genus. It resembles a glorified *Hydrangea*. The broad cymes of small white, creamy flowers are surrounded by a circle of large, pure white neutral flowers. It will be remembered that *Viburnum Opulus*, from which is derived the snow-ball of our gardens, is, in its original state, the same. By cultivation the whole cluster is changed into abortive flowers, devoid of essential organs. Both species are more beautiful before such change occurs.

A great charm of the hobble-bush, apart from the exquisite old lace of its flowers, is its foliage. The generous heart-shaped leaves are rusty with a sort of tomentum, which, covering the fresh green of the blades, adds very much to their beauty. They are rugose-veiny and emerge from naked buds—things of infrequent occurrence in our inclement regions; indeed, we are so used to scale-protected buds that we are surprised when we find any other.

Howitt, in his "Book of the Seasons," thus addresses our shrub:

"Wayfarer's tree! what ancient claim
Hast thou to that right pleasant name?"

* * * *

Whate'er it be, I love it well;
A name, methinks which surely fell
From poet, in some evening dell,
Wandering with Fancies sweet."

The bush or small tree may rarely rise to a height of twenty feet, but where we have seen it most abundantly, in New Hampshire, in New Brunswick, or about Mount Wachusett, it was not nearly so tall.

Viburnum Opulus, also native, has the common name of high cranberry, but is not related to the true cranberries of the Heath family and genus *Vaccinium*. I cannot remember to have seen this wild in Rhode Island. The berries of both these species are bright red and handsome, those of *Viburnum Opulus* having a peculiar translucent brilliance.

Other species of *Viburnum* in our state are the maple-leaved, known as dockmackie and arrow-wood, which has blue or dark-purple berries; the *Viburnum dentatum*, with sharp-toothed ovate leaves and almost metallic blue berries; and the sweet viburnum or sheep-berry, a tree from fifteen to thirty feet high and with edible fruit.

These shrubs are very apt to be confused by the ordinary observer with some of the cornuses or dogwoods, also known as cornels. The entire, and peculiarly veined leaves of these, however, at once put one on guard. Among them occur our glorious flowering dogwood—and its pretty little dwarf imitator, the bunch-berry. These are not of the poisonous dogwoods, which are sumacs, with compound leaves and dirty-gray berries.

The cornels always impress upon the writer the mistake we commit in so often going far afield for ornamental shrubs when they grow, as it were, at our own doors. Think of the azaleas, rhododendrons, laurels, andromedas, not to speak of many others.

Brown University, Providence, R. I.

NEW USE FOR HOPS.—The time-honored use of hops for brewing may in this temperance age ultimately give way to other uses. In the Old World the young and tender tips are boiled and used as a garnish for meats. They are reported to have a delicious nutty flavor. Further experiments will doubtless be necessary before hop growers turn from brewing to boiling.

BOTANY FOR BEGINNERS—XXV.

ORDER 9—SCITAMINALES.

IT may be doubted whether the average lover of flowers is aware that an entire order intervenes between the lilies and orchids, but such is the case. This order has no representatives among our Northern flowers and is usually passed over in our text-books with little or no mention. In the tropics, however, it is of great importance, as may be surmised when it is known that the banana, ginger and arrow-root belong to it. The order shows very plainly its advance over the Liliales, in its zygomorphic flowers, and underground rootstocks and foreshadows the flower-structure in the Orchidales by the reduction in the number of stamens and the differentiation of the perianth into calyx and corolla.

Practically all the plants of this order are perennial herbs patterned very much after the form of our common Solomon's seal. There is a thick knotted underground rootstock from which aerial branches rise. These aerial branches are usually short and bear numerous broad leaves, which are often arranged in two rows, necessitating the placing of one leaf directly above another on each side of the stem. The inflorescence is terminal and consists of numerous flowers, subtending which large spathe-like bracts are noticeable. An excellent example of such bracts may be found upon the banana plants in almost any large greenhouse; for the type of a slightly different flower arrangement one may investigate the canna.

The flowers are all zygomorphic and usually highly colored. There are two whorls in the perianth and in most cases the sepal whorl and the petal whorl are distinguished by different colors. Normally there should be six stamens, but this number is rarely found. In the banana family there are often five fertile stamens, but in the other fam-

ilies of the order it is common for only one stamen to be fertile, and in the canna and arrow-root families the reduction is still greater, there being but half a stamen functional. The original six stamens, however, are not entirely missing in most cases, but are turned into petal-like organs called staminodes that aid materially in guiding insects to the nectar and pollen.

The color of the flowers and the nectar seem to indicate the fact that the plants are not pollinated by the wind. It is equally certain from the size of the flowers in many species that they are not pollinated by insects. This, in fact, is one of the few orders that make use of birds as pollen carriers. Our own cannas are frequently visited by humming-birds as well as bees, and in the East Indies certain birds called honey-birds, from their fondness for nectar, assist in the transference of pollen. It is probable, however, that a majority of the species are pollinated by insects. The nectar is secreted in great quantities deep in the tube of the flowers. The fruit is either a capsule or berry. The canna fruit is a good example of the capsule, while the common banana is an example of the "berries" that this group produces. To call this a berry seems stretching the definition a trifle.

Four families make up the order Scitaminales; the banana family (Musaceæ), the ginger family (Zingiberaceæ) the canna family (Cannaceæ) and the arrow-root family (Marantaceæ). Of these families the ginger family is the largest, containing more than three hundred species.. In this family is found the ginger-plant (*Zingiber officinale*) from whose rootstocks the well-known Jamaica ginger is made. The tumeric (*Curcuma longa*) and cardamom (*Elettaria cardamomum*) are also members of this family. The seeds of other genera besides *Ellettaria* are called cardamoms. Our common cultivated canna (*Canna*

Indica) is the only familiar member of the canna family. This is the smallest family in the group with less than forty species. The rootstocks of several species yield starch. The starch-producing family, par excellence, is the Marantaceæ. *Maranta arundinacea* is the plant from which the arrow-root of commerce is obtained and the rootstocks of numerous other species may be used. There are nearly three hundred species of Marantaceæ in the tropics. In addition to our familiar banana (*Musa paradisiaca*) the Musaceæ includes the Manila hemp (*Musa textilis*) itself a banana, and the famous traveler's tree (*Ravenala Madagascariensis*). The banana family is not large, there being about eighty species included in it. Several species are grown for ornament and may be found in nearly any large collection of plants.

A FERN COMMUNITY.

BY FRANK DOBBIN.

SOME time ago I had opportunity to visit several times during the months of September and October a bit of the "forest primeval." It was only a bit to be sure, consisting of a tract of four or five acres on the premises of a wealthy farmer. Here the axe had spared a few noble old giants—elms, beeches and maples—which looked as if they might have been respectable trees before the Declaration of Independence was signed. Through the center of this bit of forest wandered a tiny brook, little more than a rivulet in fact. The moist, rich soil and the kindly shade made it an ideal spot for certain ferns, and right gladly did they take advantage of it.

All of the osmundas were present, the royal fern (*Osmunda regalis*) growing beside the brook, while over the fence in an adjoining meadow were both the cinnamon

fern (*O. cinnamomea*) and the interrupted fern (*O. Claytoniana*). The sensitive fern (*Onoclea sensibilis*) was present, as it nearly always is in such situations, as well as the ostrich fern (*O. Struthiopteris*), which lifted its tall fronds out of the black soil.

Here for the first time I made the acquaintance of the beautiful bladder fern (*Cystopteris bulbifera*), its long lanceolate fronds, usually bearing the little bulblets, hanging out over the brook in many places. Its near relative, the fragile bladder fern (*C. fragilis*), was also present, but its small fronds were nearly hidden by its larger neighbors.

Back a little way from the brook stood a clump of the silvery spleenwort (*Asplenium thelypteroides*), while by the fence at the edge of the wood lot were numerous patches of the lady fern (*Asplenium Filixfoemina*). Near the silvery spleenwort were a few individuals of *Nephrodium cristatum* var. *Clintonianum*. Both the silvery spleenwort and the Clinton's fern were new to me at that time and it can be imagined with what eagerness I began a search of the manual for their names. Back in the deeper shade grew the Christmas fern (*Polystichum acrostichoides*) as well as *Nephrodium spinulosum* var. *intermedium* and of course the common *N. marginale*. Sometime later I found in a near-by wood, by the margin of a lake, a fern which proved to be *N. Boottii*. Perhaps a closer search might have proved that Boott's fern was also a member of the community. On the dryer knolls grew the New York fern *N. Noveboracense*) and in the boggy ground by the brook the marsh shield fern (*N. thelypteris*.)

The most abundant of all, however, was Dickson's fern (*Dicksonia pilosiuscula*). It was scattered in dense mats through the more open and sunny parts of the wood. At this season of the year, September, its fronds were looking decidedly blase and hardly a perfect one could be found.

The little oak fern (*Phegopteris Dryopteris*) grew in the shade of some hemlocks, but was not at all abundant.

I also found *Botrychium tunatum obliquum*, or one of its numerous varieties, thus making a total of eighteen for this comparatively limited area. There were no rocks, and thus there was no opportunity to search for the rock-loving ferns. Considering this fact, I think the community rather a large one.

Shushan, N. Y.

A NEW BLACKBERRY FROM VERMONT.

BY W. H. BLANCHARD.

THIS is a dwarfish blackberry which belongs to no class yet described. The plants are dwarfish, erect, 5-foliate, yellowish with long, pubescent, glandular often branched racemes. From its yellowish color and dwarfish habit, it may be named.

RUBUS FLAVINANUS N. SP.

New Canes.—Stems erect, $1\frac{1}{2}$ to 3 feet high, yellowish, glabrous and nearly glandless, 5-angled and furrowed. Prickles rather slender, but strong, mostly hooked, situated generally on the angles. Leaves large in proportion to the size of the plant, very thin, 5-foliate, yellow-green and nearly glabrous on the upper surface, whiter, pubescent and velvety on the lower surface. Leaflets narrowly oval, long-pointed, cuneate at the base, coarsely and doubly serrate-dentate, outline entire, the middle leaflet widest. Petiole and petiolules grooved, slender, yellowish; prickles hooked, slightly glanded and pubescent; the petiolule of the middle leaflet $\frac{3}{4}$ inch long, the basal leaflets sessile.

Old Canes.—Erect, prickles somewhat impaired, stem slightly reddish, second year's growth, consisting of long

racemes, more or less leafy at the base. Axis nearly straight, sometimes slightly zig-zag at the base, angled, woolly pubescent with many glanded hairs. Leaves mostly 3-foliate, some unifoliate, thin, very coarsely serrate-dentate, the color and pubescence like those on old canes. Leaflets narrow, long-pointed, narrow wedge-shaped at the base. Raceme proper very long, resembling *R. nigrobaccus* Bailey, comprising most of the branch near the top of the plant, but less on the lower branches. Pedicels slender, woolly and glandular, set at a moderate angle to the axis and subtended by rather long and slender bracts. Flowers over an inch broad; petals narrow, less than half as wide as long; sepals conspicuously long and narrow, pubescent and glanded. Fruit maturing but very few drupelets, more often none. In flower late in June; fruit ripe the middle of August.

Type station in the yard and land adjoining the church in Stratton, Windham County, Vt. Dry, open ground. Altitude, 1,800 feet. This peculiar species was first noticed by me June 25, 1904, and was closely watched during the remainder of the season. The racemes and glandular pubescence reminds one of *R. nigrobaccus*, which is rare at this altitude, but in most respects it has no resemblance to that species. I have several anomalous dwarf forms that may be grouped around this.

Westminster, Vt.

SOURCE OF LACQUER.—It is said that the Japanese lacquer comes from a tree closely related to our own poison sumac (*Rhus venenata*) and that experiments have shown that our plant yields a very similar product. All that is needed to make good lacquer is some method of avoiding the poisonous exudations of the plant. There are few instances in nature where a really desirable product is so well protected as to puzzle man in his efforts to obtain it.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

THE USES OF BARK.—We are so accustomed to seeing thick and rugged bark on all old trees that we usually think it the natural result of age. According to Dr. Francis Ramaley, however, the trees in warm, moist regions, where they do not need to be protected from cold or from drying out, have smooth trunks, even in old trees. Some approach to differences of this kind may be seen in our own trees. Those with rough bark are usually found in the driest and most wind-swept positions.

EDIBLE FERNS.—The young fronds of various species of ferns are occasionally used as pot-herbs in America, but we must go to the other side of the world to find such things among the regular articles of commerce. Tons of bracken (*Pteris aquilina*) and royal fern (*Osinunda regalis*) are used annually by the Japanese. The young bracken fronds are cut off before they have unfurled, soaked in wood ashes and water for a few days to get rid of the bitter taste and are then boiled like asparagus. The royal fern is collected just as the fronds are developing, and after boiling are pressed and dried for use as occasion requires.

SWAMP-PLANT PARTNERSHIPS.—All normal plants appear to be endowed with tiny one-celled root hairs near the tip of each root, by which plant food is absorbed from the soil, but various plants have set up partnerships with certain fungi whereby the fungi, in-

habiting the outer layers of the root, secure the necessary moisture and thus obviate the necessity for root hairs. E. N. Transeau reports in the January *Botanical Gazette* that in studying certain bogs in the Huron River valley he found a long list of plants with mycorrhiza, as this root-fungus is called, among which may be mentioned the larch (*Larix Americana*), white pine (*Pinus strobus*), the black spruce (*Picea Mariana*), yellow birch (*Betula lenta*), dwarf birch (*B. pumila*), the cranberries (*Vaccinium oxyoccus*) and *V. Macrocarpon*, the running birch (*Chiogenes hispidula*), the blue berry (*Vaccinium corymbosum*) and Greenland tea (*Ledum latifolium*). Experiments seem to indicate that these mycorrhiza develop only when there is not sufficient air in the soil.

YAMS.—In the United States there is considerable haziness as to the definition of the word yam. By many the common sweet potato of the South is so called, but this is a mistake. There are no yams grown in this country, unless a few specimens may be cultivated in Florida. It would be incorrect, however, to say that no yam species grow in the United States, for one *Dioscorea villosa* is found as far north as Canada. This is not considered an edible plant. The edible species most cultivated in the American tropics apparently belong to the species named *D. alta*, *D. cayennensis*, *D. sativa* and *D. trifida*. In Jamaica nearly twenty named varieties are cultivated that may be referred to one or another of these four species. The part eaten is the underground rootstock which in some forms reaches a length of four feet and a diameter of eighteen inches. One does not ordinarily go to market for yams, or even for a yam, but for a piece of yam. There is great difference in the flesh of the different varieties of yams, some being soft and white, while others are coarser and yellowish in color. All the plants bear a general resemblance to our common wild species.

ORIGIN OF THE TERM CONSERVATORY.—In the modern use of the word conservatory, we usually mean a glass house for growing flowers, but originally the conservatory was a glass house, usually attached to the dwelling, where flowering plants were kept only while in flower. They were brought to flowering in the greenhouse in some other part of the grounds and were returned there when their period of bloom was done.

A NEW STATION FOR SCHIZAEA.—One of the most interesting of the North American fernworts is the little curly grass (*Schizaea pusilla*). For a long time it was supposed to grow in New Jersey only. It has since been found in Nova Scotia and in Newfoundland, and in the October number of the *Fern Bulletin* is a report of its recent discovery in Cape Breton. There are many who think that this curious little fern will be found at other points between these extremes.

WESTERN MULLEINS.—We folks from "the East" always first think of *Verbascum thapsus* when mullein is mentioned. Though I have not seen this old familiar species in Southern California, it would not surprise me to meet it any summer day. I have often seen *V. virgatum* hereabouts. I saw *V. thapsus* in Northern California and in Oregon in 1904. At Glendale, Ore., I saw a single plant of *V. blattaria*. So on "the coast" I have seen only the three species that I have ever seen anywhere. That white mullein (*V. Lychnitis*), mentioned by the books as rare, I have never seen.—*W. W. Munson, Pasadena, Cal.*

BEEES AND THE ODORS OF FLOWERS.—When the first crocuses opened in the editor's grounds this spring there were no other flowers of any kind, so far as known, within a quarter of a mile, and yet in less than two hours after the first one opened the honey-bees were on hand to gather the

pollen. The nearest hive of bees is about a quarter of a mile away, and the mystery still is how the bees at that distance knew of the flowers. To the human sense of smell the flowers have no odor, but it may be just possible that they are as fragrant to the bees as the lilac, locust or buck-wheat is to us. The bee has not remarkably good eye-sight, and it does not appear that the wandering bee would have so soon discovered the flowers had he been obliged to depend upon sight alone.

CHINESE SOAP-BERRIES. — Our Kentucky coffee-tree (*Gymnocladus Canadensis*) has, contrary to the statement in some botanical works, several relatives in China, some of which are used for washing purposes. The seeds and pods are the parts used. It is known that our own tree has saponin in the bark and it may well be questioned whether the seeds do not contain saponin also. The name of coffee-tree is said to be applied to this species because in the early days it was used as a substitute for coffee, but if the seeds contain saponin such use may well be doubted. Can any of our readers add anything to the solution of this puzzle? Do the seeds really contain saponin? Will someone in the region inhabited by the tree investigate and report?

AN AVIAN HERBORIZER.—The Australian bower bird has become famous for its habit of constructing play-houses, which it ornaments with various bright objects, but according to the *Oologist* our own red-shouldered hawk, though less renowned, has the same taste for the beautiful. The majority of red-shouldered hawks' nests are decorated with fresh leaves and flowers, the inclination for these ornaments seeming to increase as the nesting season advances. One nest is mentioned by the *Oologist* that was lined with the fresh green leaves of the "box-berry" (wintergreen) and the surrounding platform concealed beneath a profusion

of spruce twigs covered with their green needles. Entire plants of violets are also used, and the latter have been found in the nest so recently gathered that the flowers had not begun to droop.

ERRONEOUS BOTANY.—In a recent address Dr. W. F. Ganong called attention to the fact that when once an error gets into the text-books it is copied and passed along by other writers without hesitation. So great is our respect for the "authorities" that we seldom question a statement made with any show of erudition. If anyone doubts this he has but to get down his manual and see what the books say about the color of the ripe berries of the false Solomon's seal (*Smilacina racemosa*) and then compare this statement with the berries as they are. A few instances of this kind—and the botanical works contain many—ought to make all students a bit more hesitant in accepting facts encountered in botanical writings.

THE PLEASURES OF AN INVESTIGATOR.—Dr. E. L. Nichols, speaking before the Eastern Association of Physics Teachers at Boston recently, told of the pleasures of original investigation that may come to the student of physics. The physicists, however, have no monopoly of the pleasures of investigation. The botanical student has but to substitute botany for physics in the paragraph here quoted to make it applicable to his own line of work. "To be an investigator at all, one must have followed at least one line to the boundary which separates the known from the unknown and must interest himself not for a day, but daily year in and year out in finding trails leading outward into the wilderness. To pick out such a trail and blaze it a little way for the benefit of those who shall come after is to my mind what makes physics a live subject and the most fascinating pursuit in which a man can engage."

BIRDS AS BOTANISTS.—A British paper has recently commented upon the fact that in that country certain species of trees are likely to harbor peculiar kinds of birds. The oak is said to be the favorite with rooks and jays, and the beech with woodpeckers. In America many similar associations may be noted as the oriole and elm, the cat-bird and hawthorn, the yellow warbler and willow, the crow and the pine, etc. Such associations do not hold for all regions, unless the range of bird and tree are co-extensive, but it is conspicuous enough to be noticeable. In most cases this association is concerned with nest building, but it is difficult in some cases to understand why one tree is not as good as another for such purposes.

PROPAGATING SHRUBS.—Shrubs are best propagated from seeds. The seeds are slow to germinate, but if one has an out-of-the-way corner in the garden where the seeds may be planted as fast as one happens to collect them it will not be long before the corner yields annually a good number of choice seedlings. Such plants as send up new shoots from adventitious buds on the roots are easily multiplied in this way, while many others can be layered like grape-vines by bending down a branch, making a slanting cut half through it on the under side and covering the cut section with earth, allowing the tip of the branch to project above the surface. By autumn the branch will usually have produced roots from the edges of the cut and may now be severed from the parent plant and planted by itself.

THE BIONOMIST.—The United States Bureau of Plant Industry has a new official, or rather an old official, under a new title, this title being the Bionomist. It may puzzle our younger readers to define just what a bionomist is, and it will not be much help to look in the dictionaries, for the word is too rare to appear in many of them. Bionomy, how-

ever, is defined as a rare term for physiology, and possibly a bionomist is a still rarer form of a plant physiologist. It is a pleasure to note that the Department of Agriculture is ever on the look-out for rareties. A great government like our own, however, cannot be too careful in the terms used to designate the heads of important divisions, and before adopting as final this new title of Bionomist, might carefully investigate the respective merits of Phytonomist, Phytotomist, Phytopathologist and Phytophysiolgist. There is no use in having common names for things when rare ones are so ornamental.

THE EFFECTS OF COLD ON PLANTS.—It is well known that freezing does not kill all kinds of plants, and many investigators have endeavored to discover why different species should behave so differently under the lowering of the temperature. For a long time it was thought that during cold weather the ice formed in the cells of plants and expanding ruptured the cell-walls, thus killing the cells. This, according to K. M. Wiegand, in the February *Plant World*, is an error. Unless the temperature is lowered very rapidly no ice usually forms in the cells. The ice occurs in the intercellular spaces and begins to form on the outside of the cells, drawing the water from the cells for the purpose. During extreme cold the water may be nearly all drawn from the cells, causing the cell walls to collapse. Upon the return of milder weather the ice gradually melts and the cells again absorb the water. The death of the cells, therefore, seems to be due more to the drying out of the cell in the process of freezing than to the mere chilling of the plant. Plants with cells that can endure this drying under frost are not killed by low temperatures. In some dryish winter buds the temperature must fall to zero or below before ice crystals begin to form, but other buds may be frozen solid at higher temperatures.

Editorial.

This month, in response to the general demand, we use a larger amount of Note and Comment and we take the occasion to again and more pointedly urge our readers to contribute to this department. In your rambles this spring and during the summer almost anything that is worth your attention in the field is worth writing about. Send such observations in by postal card while they are fresh in mind. Many botanizers keep a note-book in which are jotted down notes, queries, opinions and reflections about plants in general. We want similar notes. Hunt up your old note-books and let us enjoy the things that make botany interesting to you.

* * *

After all, there is a charm about mere plant collecting that cannot be derived from any other branch of botany. All the delights of exploration and discovery await us in the nearest piece of wild land. We may have passed that way before, but the secrets of wood and field are not exhausted by one or by several such trips. And every recurring season brings new delights. For the beginner there are always new and strange plants to pique his curiosity and tantalize him until names for them are found; and for the older student, familiar with the names, there is the finding of the plants, each year anew, which is almost as good as the original discovery. But who that really loves the wild flowers will manifest his regard for them by gathering every one he can find? The fact is, the real lover of nature rarely comes back from an excursion laden with specimens. The individual with an armful of broken branches and drooping buds may tell you that she is an ardent lover of

nature, but you may be permitted to doubt it. Far better than the indiscriminate flower-gatherer is the herborizer with vasculum and press, but fortunately that relic of a former generation is fast going out of style. Very little can be said against the student with an herbarium collected by himself, but the average individual who by exchanging aims to amass a large herbarium—as if mere size were a desideratum—might better be engaged in collecting postage stamps or tobacco tags.

* * *

If you have extensive grounds there is yet time to select for planting the wild shrubs and trees that prolong autumn into winter and attract the late birds by their berries. If your grounds are too small for shrubbery you may still transplant columbine, blue-bells, trilliums, asters, sun-flowers, and many another to brighten the place until frost. If you have no grounds at all, the best advice that can be given you is to move. You cannot understand how much you are missing until you have poked about among the dead leaves in the borders of your own grounds and found the fresh, green spires of developing plants peeping above the mould early in spring, or watched the same tiny green spires wax strong and vigorous, unfurling at last their handsome flowers for your delight and comfort.

* * *

All flowers, even the so-called florist's flowers, are found wild somewhere or are descended from wild ancestry. Many of those offered by the plant dealer are most desirable for cultivation even by the botanist. Of course, the botanist will take care to select perennials and such perennials as have not been tampered with by the florist until stamens have been turned to leaves and the flowers bred into monstrosities. There is a long list to select from, and

among the best are the lilies, irises, columbines, phloxes, pinks, poppies, and bellworts. Many of these no doubt are growing in the nearest old-fashioned garden and crowns might be had for the asking.

BOOKS AND WRITERS.

Plants have their diseases no less than animals, and, as is the case of animals, a large number of these diseases are due to bacteria or fungi. The mushrooms, puff-balls and shelf-fungi feed for the most part on the dead or dying parts of plants, but there are some, even in these groups, that may be the cause of the death of trees. The great sources of disease in plants, however, are the rusts, smuts and mildews, which seize upon living plants and soon put an end to their existence. The great number of these pests makes a knowledge of how to combat them most essential to the farmers. Plant diseases annually cause losses amounting to millions in every state in the Union. To prevent some of these losses by its farmres the state of Minnesota has issued a fine volume, entitled "Minnesota Plant Diseases," by Dr. E. M. Freeman. It contains nearly five hundred octavo pages, and is divided into two parts, the first treating of the growth structure and reproduction of the fungus groups and the second dealing with the specific forms which cause plant diseases and the methods of exterminating them. More than two hundred excellent illustrations, most of them from photographs, are given and the book is a most desirable addition to the library of the fungus student, whether resident of Minnesota or not.

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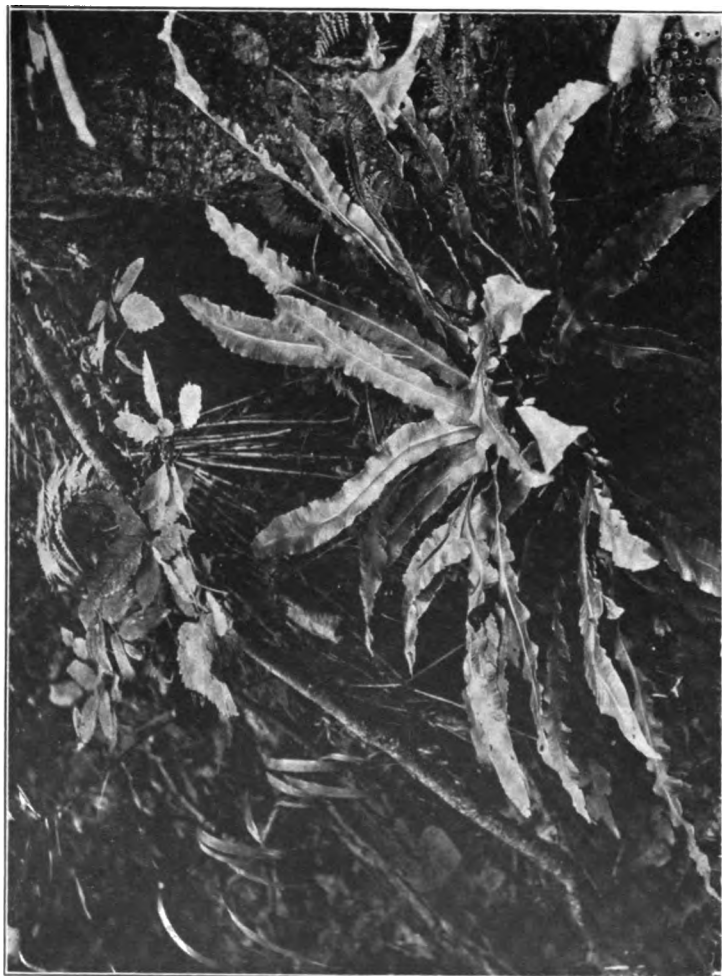
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THE HART'S-TONGUE FERN AT HOME.

THE AMERICAN BOTANIST

Vol. X

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No. 6

NAMING THE FERNS WITHOUT A BOOK.

BY WILLARD N. CLUTE.

ALL ferns look alike to the novice. Those of us who, by long association with these handsomest of plants, have arrived at a stage where we can recognize most of the common species at sight, whether in fruit or not, can look back to a time when the most conspicuous species was a puzzle and though in full fruit, was not easily identified by any book in our possession. With the increase in the study, books designed to help in naming the ferns have multiplied until even the novice rarely goes astray in his identifications. With a good book fern collecting becomes a pleasure instead of a serious study, but without a book the great majority of the species are easily recognized. He who does not have to hunt down his species through the mazes of a technical key, misdirected here and there by unfamiliar or half-understood terms, gains somewhat in the mere matter of time, but he misses something of that elation with which after a long chase we older ones pounced upon our quarry. We are not yet ready to give up the technical manuals entirely—they are still invaluable for settling questions of minute differences—and the popular books are almost indispensable, but much, as we have said, can be learned without one.

It need hardly be said, probably, that the spores of ferns are usually borne on the under side of the leaves, where the fruiting parts form curious dots of various shapes and sizes, and that the form and arrangement of these fruiting parts serve as a convenient means of identifying the species. In our study without a book, however, it will often be found

easier to seize upon some prominent character that so plainly marks our species that it would seem as if nobody could mistake it.

Let us begin with some of these unique species. Unless one lives in New Jersey, Newfoundland or Cape Breton and Nova Scotia he need not expect to find the curly grass (*Schizaea pusilla*) and even if he does live in any of these places he must be prepared to search the cranberry bogs with his nose close to the ground for days and perhaps years before he finds it. The best way is to get a better informed friend to point it out. Then it can be found again easily if it occurs at all. All along the Atlantic coast from New Hampshire to Florida one may expect to find our only climbing fern (*Lygodium palmatum*). It is not found in every locality, however. One must search the bushy borders of swamps where he may be fortunate enough to discover the slender stems with rounded palmate leaflets twining about the stalks of other plants to the height of two or three feet. The Hart's-tongue (*Scolopendrium vulgare*) of which we present a picture in this issue, is too rare to be counted upon unless one lives in Central New York or the country east of Lake Huron. Our illustration is from a plant in its native haunts in Central New York and was photographed by Mr. H. E. Ransier. The fronds are unmistakable being a foot or more long and two or three inches wide with entire margins. The walking fern (*Camptosorus rhizophyllus*) is possibly as much sought for by the beginner as any species we could name. The title of walking fern has a peculiar charm and one always remembers his first sight of the curious fronds. Fortunately this fern is not so rare as the books would have it. Go to the nearest deep, shady woodland, search the moist, but not wet rocks, and when you find a plant with dark green leaves, heart-shaped at base and not half an inch wide and tapering gradually to a

slender apex, rejoice. The whole plant may sometimes be covered by one hand. There is nothing else, so far as I know that looks much like it.

Leaving the rarities, let us glance at some of the common things, beginning with the very commonest. If you have ever seen a swamp in spring with ferns growing waist high in it, and if in the circles of fronds there appeared here and there brown, club-shaped spikes, know that you have seen the cinnamon fern (*Osmunda cinnamomea*). No other fern can be mistaken for it when thus in fruit, but unless one looks sharp he may pass unnoticed its nearest relative, the interrupted fern (*O. claytoniana*.) Its fruiting frond is not wholly brown, but has green leaflets at both base and apex. Several pairs of the middle leaflets are turned to fruiting bodies and by this sign, alone, you shall know it. The royal fern or flowering fern (*Osmunda regalis*) is another of this family, but in this only the upper part of the frond bears fruit. From its appearance it is called the flowering fern though no ferns, of course, ever bear flowers. No other fern fruits in this way. Look for it in swamps and wet woodlands.

There are several ferns with triangular fronds that for our purpose may well be classed together, though neither Nature nor the scientist would subscribe to such an arrangement. In dryish woodlands and along roadsides one is sure to find the largest of these triangular species. It belongs to the bracken (*Pteris aquilina*) so familiar to readers of English song and story. Often the fronds are three feet across. The fruit is borne in a narrow line on the borders of the leaflets. In moist woods occurs another triangular species. This is the rattlesnake fern (*Botrychium Virginianum*). It is a rather fleshy species, and may further be distinguished from the bracken by producing its fruit in a slender brown cluster that rises erect from

the base of the green triangle. The rattlesnake fern fruits in early summer. In September and October another *Botrychium*, the grape fern (*B. ternatum*) appears. Its time of fruiting distinguishes it from all others but its much smaller size and its habitat in pastures and open woods will help. It may be said in passing that the species makers have operated upon this plant until they have described a large number of varieties of no especial importance. Still another triangular species is the little oak fern (*Phegopteris Dryopteris*). It is only a few inches high and delights in deep moist woods. The yellow-green fronds are like three tiny fronds in one and bear their fruits on the under-side of the leaf in the shape of tiny dots. It cannot be mistaken for any of the others. In dryish woods is another member of this family called the broad beech fern (*P. hexagonoptera*) and on wet rocks may be found still another, the common beech fern (*P. polypodioides*). These two latter are not easily confused with any of the others, but they resemble each other so much that one must resort to the books to make sure of his identification.

All these common species are deciduous except the grape fern which keeps its one fleshy leaf until time for a new one to start. We do not lack for evergreen species among common ferns, however. One that every Rambler in rocky woodlands has seen is the Christmas fern (*Polystichum acrostichoides*). Its fronds are dark green and leathery and a foot or more long. The leaflets are eared on the upper side at base, and when the fruiting fronds appear they bear the fruit on the upper half of the frond which is abruptly narrowed for the purpose. No other species has this peculiarity. While in the rocky woods look for the polypody (*Polypodium vulgare*). It is nearly certain to be present. Examine the tops of shaded ledges, the crests of boulders and other dryish sterile places. The

plant looks like the Christmas fern but is smaller, lacks the eared leaflets, the narrowed apex and its fruit is found in rather large roundish dots on the under surface. On such rocks one may find the common bladder fern (*Cystopteris fragilis*) and its ally the bulb-bearing bladder fern (*C. bulbifera*). The woodsias, too, especially *Woodsia obtusa* and the rusty woodsia (*W. Ilvensis*) may occur, but it is not easy to describe them so that the novice will recognize them. All are small or medium-sized ferns. *Cystopteris fragilis* is commonest. *C. bulbifera* thrives only on moist rocks while *Woodsia Ilvensis* almost insists on the tops of the driest rocks, often in full sunshine.

In almost every swamp one may find the sensitive fern (*Onoclea sensibilis*) with coarse and unfern-like foliage that is not at all sensitive to ordinary stimuli. Its fruit resembles small green or dark brown berries borne in compound spikes; they appear late in the year and often remain erect above the snow all winter. They are familiar objects to the rambler in winter. The ostrich fern (*Struthiopteris Germanica*) is a near relative. It has foliage like that of the cinnamon fern, but the fruit is produced late in the year and is more like that of the sensitive fern. Another fern that resembles the cinnamon fern is the common woodwardia or chain fern (*Woodwardia Virginica*). Its fronds do not grow in circles, however, and the fruit is borne in oblong dots on the under-side of the fronds. The sterile fronds of the narrow woodwardia (*W. Angustifolia*) resemble those of the sensitive fern but the fruit is borne on the under-side of the fronds instead of in berry-like spikes.

There is no use in describing the maidenhair (*Adiantum pedatum*) for everybody knows it, nor in describing the various members of the *Nephrodium* and *Asplenium* genera for they cannot be certainly separated without a book. It may be said, however, that the *Aspleniums* are

mostly rock ferns and the *Nephrodiums* are so frequently found in woods as to be called wood ferns. In sandy or rocky woods one may find the ebony spleenwort (*Asplenium ebeneum*) and on shaded ledges the green rosettes of the maidenhair spleenwort (*A. trichomanes*) the silvery spleenwort (*Athyrium acrostichoides*) must be sought along woodland rills while the lady fern (*A. filix-foemina*) is everywhere. Among other rock spleenworts are several of our rarest species.

The commonest wood fern is the marginal shield fern (*Nephrodium marginale*) to be found in nearly all rocky woods. In dry woods look for the New York fern (*N. Noveboracense*) and in all swamps a slender species will prove to be the marsh fern (*N. thelypteris*). That tall finely dissected fern in rocky woods is the spinulose fern (*N. spinulosum*) which has many puzzling disguises. Goldie's fern (*N. Goldieanum*) is a large fern like *N. marginale*. It is not abundant, and therefore all the more desirable.

Space does not admit of a mention of all our species, nor all of even the common ones, but those mentioned may easily be identified this summer. As for the rest—it is good to have here and there a plant to pique the curiosity. With the mention of the boulder fern (*Dicksonia pilosiuscula*), a fragrant species in all elevated regions, I am done except to wish the novice fern student much pleasure and profit in naming his specimens.

MEADOW FLOWERS.

BY DR. WM. WHITMAN BAILEY.

THE tropics may boast of palms, bamboos, swinging vines which hang like cordage from the forest trees, and bizarre forms of orchids and bromeliads. We

acknowledge the grandeur and beauty of all these, but still we think no southern forest can surpass, or even vie with an apple or peach orchard in full bloom; the woods when gay with dogwood, or splendid with mountain laurel. Then, above all, we have our meadows, billowy with grasses or bespangled with buttercups and daisies.

We find ourselves often endowing plants with human attributes, and each has its character and its special friendships. This idea formerly regarded as essentially poetical, now meets with scientific recognition in such terms as "plant communities" and a student in collecting is asked to note the associations which plants form with each other.

In early summer the meadows are yellow with bulbous buttercup—at least in New England. By the time this passes away, the ox-eye daisy will spread its stars over the lawn—so very beautiful if they were not so common. The "Marguerites" or "pearls" are ever associated with fortune telling—and it is not alone poor Gretchen who plucks their prophecying rays. The English daisy—"the wee crimson-tipped flower" of Burns, is a very different plant, and in America seen only in cultivation in lawns or in garden beds.

At this season we often see a red flush over the meadows. It is caused by the sheep-sorrel. The individual plants have little to commend them, but from a distance, when they wave with the grasses they give to this red sea an appearance of changeable silk.

The red clover is protruding its ruddy blossoms, while the little white one creeps along by the roadside. Much prettier than either, is the now rather common alsike, with delicate pink heads. It is the *Trifolium hybridum* of science. Equally fine is the pompom-like crimson clover now and then grown in New England, *Trifolium incarnatum*.

Hidden away in the grass are the flowers of mouse-ear chickweed—a bad weed, as is also the very pretty little speedwell. Most of our weeds are foreigners from Old England. Perhaps they were passengers on the Mayflower and sprung up first upon the Plymouth coast. They own a pedigree that antedates Hastings and the Conqueror. King and president are all alike to them. Their office is to make the world more beautiful. It is a simple duty—but is faithfully performed. Who would wholly eradicate these humble servants that minister to our delight? Be sure, that as the children love them, they are good.

Brown University, Providence, R. I.

A NEW VERMONT BLACKBERRY.

BY W. H. BLANCHARD.

The species of blackberry here described and named belongs to the *Setosus* class, but it has little in common with the plants generally known as *Rubus setosus*, Bigelow, and to which Prof. C. H. Peck in 1891 gave the name of *R. hispidus* var. *suberecta*, and which Dr. P. A. Rydberg in 1901 named *R. nigricans*, these being generally soft-stemmed and beset with a multitude of soft bristles with as many glanded hairs interspersed.

RUBUS GROUTIANUS, n. sp. small, erect, five-foliate, glabrous plants with very numerous strong, bristle-tipped prickles and a short, bristly inflorescence.

New Canes.—Stems erect, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, reddish, glabrous and glandless, nearly terete with angled pith. Prickles numerous, 150 to the inch of stem, recurved, bristle-tipped. Leaves rather small, five foliate, yellow-green on the upper surface, lighter on the under surface, glabrous on both. Leaflets oval, long-pointed, outline entire, finely and

doubly serrate, the middle one widest, often somewhat rounded at the base, the others wedge-shaped. Petiole and petiolules grooved little or none, glabrous, prickles numerous, strong but slender, hooked; the petiole of the middle leaflet less than one-half inch long, the other leaflets sessile.

Old Canes.—Stems erect, prickles considerably impaired. Second year's growth consisting entirely of leafy branches tipped with inflorescence, one from the axil of each old leaf. Branch stems terete, zig-zag, six to nine inches long, prickles, glabrous, hooked. Leaves three-foliate, thin; leaflets short-pointed, broad-oval, rather coarsely serrate, glabrous; the petiolule of the middle leaflet short, the other leaflets sessile. Inflorescence a short raceme, one to one and one-half inches long, the axis and slender pedicels set at a great angle to it densely beset with slender prickle-bristles, straight and set at right angles to their axis with an occasional glanded hair on some plants and a faint pubescence. Flowers seven-eighth inch broad, petals slender, less than one-half as wide as long, appearing the last of June. Fruit globose, one-fourth inch or more in diameter, drupelets rather large, black, not productive; ripe the middle of August.

Type Stations: In Wait's pasture, West Wardsboro, Windham County, Vt., one mile east of the village, at an altitude of 1,700 feet, and in the road between the church and town house in Stratton, Vt., four and one-half miles west of the West Wardsboro station at a somewhat higher elevation. Open places, dry ground.

I found this species June 27, 1904. It is very abundant at the first named station, scattered over a large pasture. The stations in Stratton show that it is not a local plant. The name I propose is to commemorate that of people who were once numerous and prominent in Stratton, and for whom Grout Pond is named, and whose descendants are

scattered widely, including Dr. A. J. Grout, well known to moss students; but more especially to commemorate the hero of a famous anecdote. He was a precocious boy but five years old, who wandered away a few miles on the crust in the sugaring season and came into a little sawmill village called Ireland. Being told that he was in Ireland he asked them to help him find his way to "Stratton, North America."

Westminster, Vt.

MANNA.

MANNA is collected from the "*Tarfa*," or tamarisk, the manna ash, the camel thorn, the larch, the cedar, the Australian *Eucalyptus viminalis* and even some edible lichens, such as *Lecanora esculenta*, and its allied species are known by this name. According to Burckhardt the manna from the tamarisk (*Tamarix gallica*) drops from the thorns, on the sticks and leaves with which the ground around these trees is usually covered, and must be gathered early in the day or it will be melted by the sun. "The Arabs cleanse and boil it, strain it through a cloth, and put it into leathern bottles, and in this way keep it uninjured for several years. The manna ashes (*Fraxinus ornus*, *F. Europaea* and *F. rotundifolia*), yield manna in consequence of a puncture made by an insect resembling the locust, known as *Coccus mannifarus*. The substance is fluid at night and resembles dew, but begins to harden in the morning. *Fraxinus ornus* was introduced into England in 1730 by Dr. Uvedale.

The camel thorn, which grows in Northern India and Syria, produces the description known as *Al baj*, or Persian manna. The larch and the famous cedars of Lebanon also furnish a manna of their own, but although prized and eaten by the natives of the countries where they are found, these

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kinds of manna do not seem to possess the useful properties of the manna ash, which is the manna of European commerce. The Australian *Eucalyptus viminalis* exudes crumbs of an edible manna, which is very sweet, and is used to produce the opaque drops called honey-manna, or melitose.

Of the edible manna lichens, *Lecanora esculanta*, and *Lecanora tartarea*, the coloring matter known as litmus is made. This kind of lichen is sometimes torn up and transported by violent gusts of wind and falls in showers several inches thick. In 1829, during the war between Persia and Russia, there was a great famine in Oroomiah, southwest of the Caspian Sea. "One day during a violent storm the surface of the country was covered with lichens, which fell from the sky in showers. The sheep immediately attacked and devoured it eagerly, which suggested to the inhabitants the idea of reducing it into flour and making bread of it, which was found to be palatable and nourishing."

During the siege of Herat, there is mention made of a hail of manna which fell upon the city and provided the inhabitants with food. In April, 1846, in the government of Wilna, a rain of manna occurred, forming a layer upon the ground three or four inches thick. It was of grayish-white color, rather hard, irregular in form, inodorous and insipid. It is to be found in the Great Desert of Tartary, on the steppes to the north of the Caspian Sea, in the Altai Range, in South America and in Algeria.—*Indian Planting and Gardening*.

A SALAD FRUIT FROM THE TROPICS.

AS our contact with the tropics becomes more and more intimate, and transportation facilities are improved, the number of fresh food products received from tropical

countries is rapidly increasing. Among the most promising of such articles is the avocado, (*Persea gratissima*) still little known, but rapidly increasing in favor. The avocado, though technically a fruit and usually referred to as such, is from the culinary standpoint no more a fruit than the cucumber. It is more accurately described by the term "salad fruit," and may be said to stand alone as the only fruit that when ripe is eaten almost exclusively as a salad. The nearest approach to this is perhaps the olive, which is eaten more as a relish. This unexpected role no doubt accounts to a large extent for the dislike or indifference often professed by persons tasting the avocado for the first time. As in the case of the olive, where the novice usually describes the fruit as an insipid pickle, the appearance of the avocado leads one to expect a sweet or acid fruit, and the more or less unconscious disappointment usually leads the experimenter to pronounce the avocado tasteless and oily. One writer describes it as having a "taste not much like that of our pears (the avocado is often called 'alligator pear'), and in first trying to eat the fruit one may pronounce it a poor pear, but a good kind of pumpkin," and adds the charitable suggestion that "cooking or preserving may bring out the hidden virtues."

Few persons who live for any length of time in countries where avocados are to be had fail to acquire a taste for this delicious salad fruit. It is the rule, however, that the taste for an entirely new article of diet has to be cultivated, and a food which was unknown to our fathers and which we meet for the first time after our tastes have been formed is seldom accepted at the first trial. In most cases it is only after repeated attempts, prompted usually by the assurances of the initiated, that a fondness for the strange article begins to grow. The human taste is, however, fairly uniform, and a liking for any food that is popular in its native coun-

try is usually acquired by the stranger if his first attempts do not create a prejudice so strong as to prevent further experiments. As examples of foods that when first tried outside of their native country were by most people either disliked or considered insipid, but which have since become firmly established may be mentioned olives, bananas, artichokes, chocolate, tomatoes, curries and peppers. With avocados the taste is usually acquired after two or three attempts, and many profess a fondness for the fruit at the first trial. That the taste when once acquired amounts to almost to a craving is attested by prices paid for the fruit in the northern markets, where 15 cents each is about the lowest figure at which they can be bought, and good fruit usually sells as high as 30 cents, though 50 or 60 cents is not an uncommon price. The avocado may thus be said to have taken the first steps along the lines by which most foreign fruits have been successfully introduced. An early impetus was received when the fruit was served on the tables of the rich and fashionable, its intrinsic merit being aided, without doubt, by the desire to inaugurate a novelty at once rare and expensive. The tendency to imitate this use assisted in increasing the demand until the fashionable hotels were able to score a point by adding the fruit to their menus. From this stage to that of introduction into the markets and fruit stores, where the general public will make its acquaintance, is, perhaps, the slowest and most crucial step in the history of a successful new product, and one that the avocado is at present undergoing.—*From Indian Planting and Gardening.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

INSECTS AS AIDS TO FUNGI.—The plant world is often divided by botanists into the two groups of seed-plants and spore-plants, or, as we commonly call them, Phanerogams and Cryptogams. The distinction is based upon the fact that one division is reproduced by seeds, while the other effects the same end by spores. The seed is a familiar object; as an example of spores, the dust-like particles composing the “smoke” of puffballs may be mentioned. The seeds are rarely distributed by insects—flowering plants find the wind, water, birds and mammals more useful—but the spore-plants, which may also make use of the wind and water, often seem to specially invite the insects. The ergot fungus of rye provides a sugary solution with its summer spores, to induce insects to carry them about, and some of the spores of rusts are similarly equipped. In the carrion fungi the offensive odor of the spore-mass attracts flies, which, alighting upon the sticky spores, carry many away attached to their legs and bodies. Although we make a distinction between seed-plants and spore-plants, there are really no seed-plants that are not spore-plants also, for the pollen grains are spores. Reflecting upon this we see that even the highest seed-plants, though they may adopt other agencies for their seeds, have found it convenient to call the insects to their aid in transporting the spores.

EDIBLE FOLIAGE PLANTS.—Certain species of *Coleus* are so extensively used in this country for the decorative effects of their variegated leaves that they are generally known as foliage plants. It may be news to some that in other parts of the world the species of *Coleus* have other uses. In India *Coleus barbatulus* is cultivated for its tuberous roots, which are eaten as pickles. The plant is said to be ornamental enough to be planted among other flowers. The bread-and-butter plant (*Coleus aromaticus*) is another member of this genus cultivated in India. It has fragrant, fleshy leaves and is often eaten as a salad with bread, whence the common name.

INSPIRATIONS TO BOTANISTS.—There was a time, of course, in the lives of all great botanists when they knew absolutely nothing about botany. Some few came from botanical families, and so almost unconsciously acquired the rudiments of the science, but it is interesting to note what trivial things turned the attention of others toward plants. Thomas Nuttall was a printer, and came to America to follow that trade. Happening to become curious about the Virginia creeper, he grew interested in botany and soon became famous in the study. Asa Gray had his attention first turned to botany by the little spring beauty (*Claytonia Virginica*). Gray's early botanical studies were greatly advanced by his association with Dr. John Torrey, who, according to report, obtained his early botanical knowledge in a peculiar way. Torrey's father was sheriff in New York City, and during his term of office a certain early botanist was imprisoned for some small offense. From this botanist young Torrey obtained his first start in botany. Without doubt many of the readers of this paragraph can distinctly recall the circumstances that inclined them to the serious study of plant-life.

DEFINITION OF A FLOWER.—Even the botanist finds it hard to say exactly what a flower is. An essential part of every flower is either pistils or stamens, and usually both are contained in the same flower. These organs, however, are morphologically transformed leaves bearing spores of two kinds, the small spores being known commonly as pollen and the large ones as ovules. But even among the fern allies, such as the selaginella, there are leaves of this kind, so that under this definition it would not be incorrect to claim that some fernworts have flowers. If, however, we define a flower as one or more sets of essential organs surrounded by floral leaves, we will have to exclude the conifers and many amentaceous plants from the lists of those that bear flowers.

THE STRIPED MAPLE.—One of the handsomest small trees in any locality is the striped maple (*Acer Pennsylvanicum*). The deep green bark striped with pure white is most noticeable during the colder months of the year, but the drooping racemes of straw-colored flowers in early spring and the fresh dark green of the leaves in summer are equally attractive. With us the tree is seldom found in cultivation, but the British are more appreciative and often plant it. It is hoped that our own country will not have to be settled as long as those of the Old World have before we appreciate the beauty of a plant without regard to its place of origin. In England the tree is sometimes called snake's bark maple, though it may be questioned whether anyone ever saw a snake with bark on it! There seems to be no use for coining this absurd name when the plant already has several more expressive. In this country, in addition to the name at the beginning of the paragraph, it is called moosewood, whistlewood and striped dogwood.

STYLE AND STIGMA IN POLLINATION.—There is probably no student of flowers that does not know, in a general way, what offices are performed by the style and stigma preliminary to fertilization, but many may not be aware of the exact nature of these offices. When the pollen falls upon the stigma it begins to germinate and gives rise to a structure called the pollen tube that pushes down through the style to the ovules. But pollen tubes cannot be built without nourishment and therefore the interior of the style consists of a nutritive tissue upon which the pollen tube can draw. The stigma is really the point at which this nutritive tissue comes to the surface and this accounts for the fact that the stigmatic surface is not always at the apex of the style. In some long styles the interior is hollow but lined with nutritive tissue. In cases where a single style serves for a several celled ovary a branch of the nutritive tissue is given off to each compartment.

THE INTERPRETATION OF SPECIES.—At present there are no unvarying rules for distinguishing new species. Whenever a student discovers an unrecorded difference between two plants he is at liberty to consider the difference specific if it appears so to him. At the same time, we are all aware that what may appear specific differences to one may not to another. Real specific differences, however, are not matters of individual opinion or judgment, but are more fundamental. By the long and tedious investigation of embryonic structures we may at last find just how much of a plant's character is due to its environment and how much is due to something deeper. When specific lines are finally drawn in this manner the botanist who has based a lot of new species upon mere fuzziness of leaves, color of flowers or size of fruits will be a surprised and disappointed individual.

Editorial.

With the beginning number of the new volume of this magazine a change will be made in the number of issues. The summer lecture engagements of the editor now take so much of his time that during this season the magazine is unavoidably delayed to the great annoyance of readers and publishers alike. With a view to escaping this in future, we purpose issuing ten numbers a year, skipping the months of July and August. At the same time the magazine will be increased in size by the addition of four pages to each issue, so that readers will receive exactly as much each year as before. We do not intend to lessen the amount of matter published, but simply to put it in more convenient issues. The September number will therefore be the first of the new volume, and this will be issued in late August so that the period in which no number is issued will not be long. The new volume will be improved in various ways, but from the letters recently received we appear to be publishing about the kind of matter wanted and shall continue on the same general lines. With this issue, bills will be sent to all whose subscriptions have expired and we trust that the excellence of the numbers issued thus far this year will incline every reader to a prompt renewal.

* * *

This magazine desires illustrated articles for use as leaders in the numbers of the new volume and we hereby offer a year's subscription for each illustrated article. We are well aware that this is not a magnificent price to pay, but it is better than the other magazines pay and we hope is only preliminary to a better price. It depends largely upon how the public receives the project. The illustrations

may be either photographs or line drawings in India ink and must *illustrate*. We do not care especially for illustrations that cannot be explained as well by the text. Photographs of fine specimen plants or groups of plants are desirable and so are drawings of interesting flowers, fruits, etc. In making such illustrations due regard should be had for the size and shape of our frontispieces. The text accompanying the illustration should follow the same general treatment we have given in previous issues. Articles on how to distinguish the various species in groups of showy wildflowers, articles on single plants of interest and similar subjects will be welcome.

* * *

It seems curious that in regions where Nature is most lavish with her botanical treasures, students of the plants are most difficult to find. Evidently the people at large take very little interest in the subject, for it is noticed that books on the botany of the South, whether technical or of a more popular nature, find most of their purchasers in the Northern States. It would be interesting to know just why this section of our country is so lacking in an interest in the plants. Possibly it is because botany is not given much prominence in school and college work there. When one considers the abundance of available material ready to the hand of the botany teacher during the very season when school is in session, he wonders that every school has not an enthusiastic class in botany, and every town a botanical club.

BOOKS AND WRITERS.

A few years ago the study of botany was supposed to begin and end in pulling flowers to pieces and learning their names. Now-a-days all this is changed, and the well-regulated text-book for school use invariably begins with seeds and follows the development of the young plant through stems, roots and leaves to the flowers and fruits. Such

courses are intended to cover a half year of school work, but when it comes to the course in botany for a second half year, opinions begin to differ. The recently issued "Introduction to Botany," by W. C. Stevens, presents a somewhat composite course, which includes a brief survey of the flowerless plants, a study of typical seed-plants and ecological and geographic botany. In the first half of the book we note numerous new and excellent illustrations, which cannot fail to make the text clear to the average pupil. The second part is equally well illustrated, but in the opinion of the reviewer not enough attention is given to the lower orders of plant life. The selection of typical seed plants to take the place of the dreary dissertations on plant relationships common to most books is a commendable feature, and the chapters on the adaptations and distribution of plants are equally good. There is an unusually good glossary. The inclusion in such books of a manualette of a few spring flowers cannot be commended. If systematic botany is to be taught at all, a real and comprehensive manual should be selected. The text of the present volume is excellent, and will no doubt add to the interest as well as to the knowledge of the pupils using it. (Boston: D. C. Heath & Co., 1905; \$1.50.)

The third annual meeting of the Botanical Symposium will be held from July 2d to 9th, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, New York. Through the courtesy of the members of the Adirondack League Club the privilege of occupying the club house for one week is extended to the members of the conference. Tickets should be bought to Fulton Chain Station on the Adirondack Division of the N. Y. C. & H. R. R. Single fare from New York City, \$6.46. Board \$2.00 to \$3.00 a day. Stages will meet the party at Fulton Chain Station. Botanists are requested to notify Mr. Joseph Crawford, secretary, 2824 Frankford avenue, Philadelphia, Pa., if they intend to attend the Symposium.

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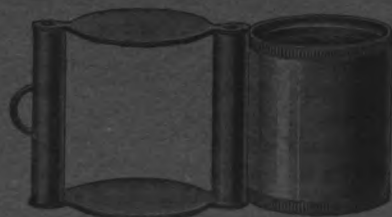
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1907

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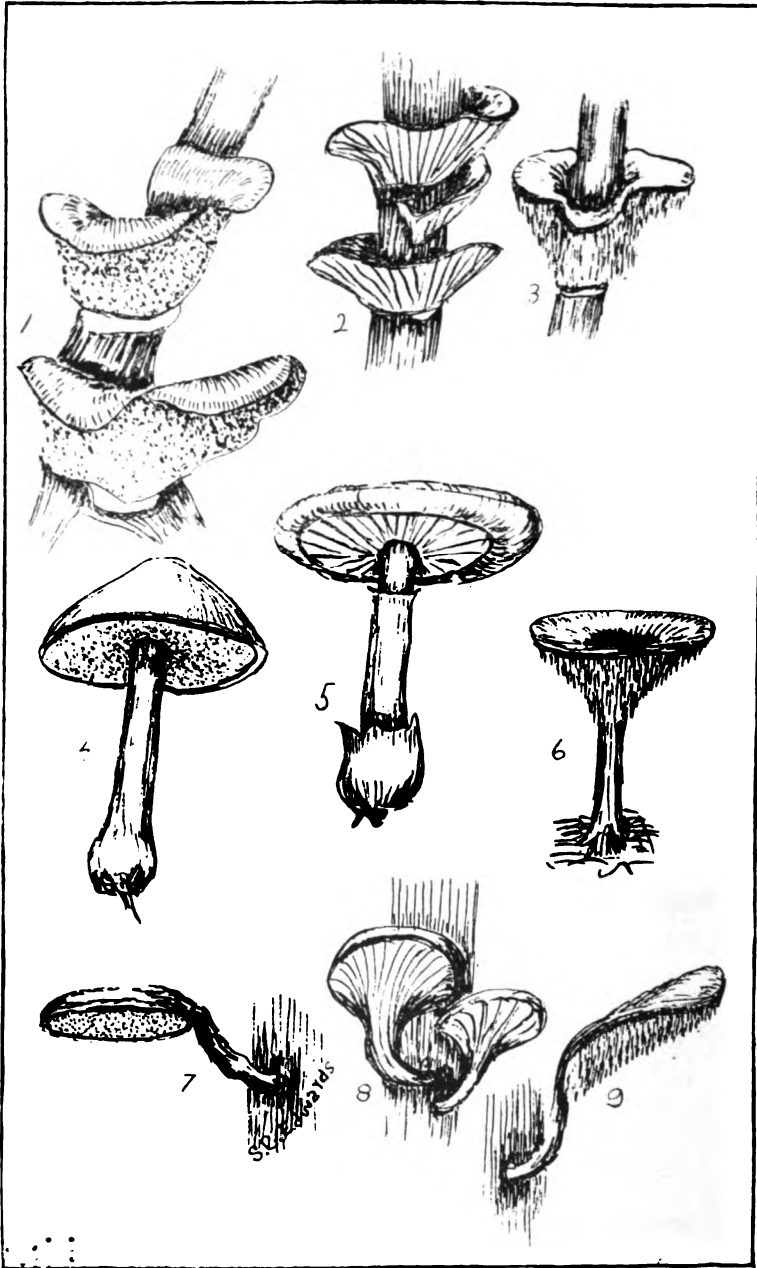
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FORMS OF FUNGI.

THE AMERICAN BOTANIST

VOL. XII.

JOLIET, ILL., JUNE, 1907.

No. 5

WHY AND HOW TO BEGIN STUDY OF FUNGI.

BY STAFFORD C. EDWARDS.

NEARLY every one enjoys a walk in the fields and woods. If we ask ourselves concerning the pleasure thus derived, we would doubtless conclude that we are attracted by feeling the soft earth and leaves under our feet, by smelling the delightfully cool and fragrant air, by seeing the delicate plants just from nature's workshop, as yet unharmed by rude and vulgar contact, other plants perchance not seen by us before, and in other places great logs and stumps in the natural process of decay, untouched by the ravages of fire, a clean example of natural return to elements from which it was constructed. If we see a beautiful bird and hear some of nature's sweetest music, so much is added to the total recompense for the walk.

To those brought up in the noisy, dusty city, and unaccustomed to the "lonely" woods, the interest is but fleeting and shallow. To pick a few blossoms and leaves, soon to be thrown away, to throw stones at a few frogs and birds, and perhaps to climb a tree, these are the round of amusements afforded by the woods. To the one who has learned to "see" things when abroad, the ramble over hills and among the trees has quite a different meaning. If we are acquainted with ten plants we meet, if we know the names of the trees, if we notice several kinds of rocks, if we have seen among the birds some that we know, we have met so many old friends welcome and charming. We are still more delighted to meet a new friend if one concerning which we have heard or read presents himself among those already known. Any one who

has experienced these pleasures can readily understand why the naturalist does not need the company of his fellow man for long periods at a time to make his happiness.

A city bred person often does not contemplate with pleasure the prospect of a forced sojourn in the country. He does not know how to amuse himself. He does not have the advantage with the naturalist of meeting on every hand, so many of his friends. We can not all hope to become naturalists but the more of the out-of-door friends we claim as our own the greater pleasure is ours each time we go afield.

Probably many who are in the habit of taking strolls in the woods and meadows, and who derive much pleasure there in meeting known friends, have seen the plants of various form and color commonly called "toadstools." With this practical designation, the whole class has been passed by. I would that more knew how easy it is to make these humble members our cherished friends though lowly they may be in the scale of plant life.

Exclusive of puffballs, the most common fungi met with in field and wood may be readily placed by the ordinary observer into one of four classes. By examining the underside of the fungus when found, it will be seen to possess either pores, very small, yet easily seen with the unaided eye, or gills, or spines or a smooth surface. Probably the greater part found will be of the first class. The fungus having pores may be shelving out from the side of a log or stump (fig. 1.) or it may have a central stem like the common mushroom (fig. 4) or again it may have a lateral stem as is in figure 7. The pore fungi constitutes a very large order, which order contains some of the fungi most commonly met. But for the beginner it should suffice simply to know the pore bearing from the others.

The fungi having gills to be the most commonly observed are the central stemmed ones (fig. 5) and one other variety of

the shelving kind (fig. 2). Then those will be found that seem to partake of both characteristics, gills and pores called daedaloid, meaning ornamental, the most common one growing on oak stumps and logs, having gill-like channels, the walls of which are connected by partitions at irregular intervals or so closely together that the surface resembles the first class in being porous.

The next class to be observed with ordinary frequency are those fungi whose spore bearing surface is smooth. Where pores or gills appeared in the former named classes the under surface is unbroken by channel or tube. The Stereums (meaning smooth) are mostly of the bracket type and closely resemble on the upper surface some of the common porous varieties.

The fourth great class of fungi to be mentioned here are those whose spore bearing surface is covered with spines or teeth. The Hydnums (meaning spine bearing) may be found in nearly every shape, central stemmed (fig. 6) side stemmed (fig. 9) shelving (fig. 3) or in irregular masses.

After noting the above mentioned four types of spore bearing surface, the beginner can give attention to the appearance of the upper surface of the various forms of fungi. They may be smooth and papery, or minutely hairy or with a coarse, wooly covering, or again with fibrous scales. In color the dull browns, perhaps, predominate, but fungi may be found with almost any color—red, purple, yellow, green, white, or black. These colors may be evenly distributed over the surface or displayed in concentric or radial bands.

In texture, fungi may vary from the very hard woody ones, through various grades of tough leathery forms, to the fleshy and spongy varieties, even to jelly-like masses.

Fungi with stems may be easily separated into several classes by noting a few very plain features. In some the gills run part way down the stem, in others they may be notched

so as not to touch the stem at all. The stem may be fleshy or fibrous, solid or hollow, adorned with a ring around the top, or inserted in a cup at the base, or both the last named features may be present in the one specimen,—in which case beware!

Every one accustomed to the woods knows that fungi may be found almost anywhere, in the meadows, in old pastures, about old buildings, among shady bushes, in the deepest woodlands, on the ground and on wood in all stages of decay. It is a matter of equally common observation that fungi grow most abundantly during the cooler months, even into the depths of winter. On the fifteenth of January last I gathered a large pan full of the savory oyster mushrooms.

To those interested in fungi otherwise than from a botanical standpoint, the first question presenting itself is how to tell the ones good to eat. To answer the question by a simple rule for determining would immediately brand its author as an unreliable guide in the matter. The only rule I ever heard which seems to be thoroughly reliable is, "Eat them and if you live they are edible, and if you die they are poisonous." Since mushrooms are not a necessity, to the average person, the application of the above rule seems hardly practical. One should know mushrooms before attempting to eat them. Many varieties are good eating and truly a great delicacy, others are harmless and without flavor, while some few are extremely poisonous. If one is interested from the culinary standpoint, a little patient observation, together with study of a good book on the subject will give much of the desired information and incidentally reveal a new pleasure.

New Brighton, N. Y.

WAYSIDE FLOWERS.

BY DR. W. W. BAILEY.

ANY country may be known by its wayside flowers. The hedges and copses along the highways and paths of England show a peculiar flora. Those of Germany, France, Italy or Spain are again distinctive. Quite different are these as a rule from ours, although, as the home of the immigrant from all lands, one finds here a cosmopolitan collection. This is true, however, only near the cities; in the country American plants predominate.

British flowers have become a sacred part of English literature. From Chancer and the older bards, down to Mathew Arnold and Tennyson, the poets have revelled in them. Who does not know cowslips, oxlips, primroses, fox-gloves, cuckoo-pint and Canterbury-bells; daisy and dandelion, thyme, Marjoran and

“All the idle needs that grow
In life’s sustaining fields?”

Our own wild flowers too have been chronicled in sweet verse by Longfellow, Bryant, Lowell, Emerson, Thoreau, Whittier, and Holmes.

Of course the kind of flowers found by the highway will vary with the season. In June we notice the broad cymes of elder, like some rich and mellow point lace, creamy with age. Reflected in the still water it is very lovely. Wayside meadows are studded with Rudbeckias—“black-eyed Susans,” very splendid. Another field may be white with oxeyes, a billowy sea of foam. In low moist places one observes the dainty Pogonia, an orchid pink in hue and fragrant of violets. Do not mistake it for Arethusa, so like yet different. The latter is odorless and of deeper color; leafless too, while Pogonia has one leaf half-way of the stem. Calopogon, another orchid, is near it, peculiar for its erect crested lip. Usually it bears several magenta colored flowers. This is a tint esteemed by nature, and, as a rule, abhorred by man.

Here too, may be found the round leaved sun-dew, carnivorous in habit, a plant about which much has been written by Erasmus Darwin, his distinguished grandson, and other noted observers.

One notices in the fields tall and slender spikes of the blue lobelia, garnet gems of Deptford pink, and yellow stars of St. Johnswort. Nature is especially fond of yellow, and keeps something of that hue all summer. Thus in some sections the roadside will show in succession, coltsfoot, ragwort, St. Johnswort, yellow-topped chrysopsis, pretty little sensitive plants, autumn dandelions, and last of all, golden-rods. Thus is she lavish of her gold.

A very pretty and delicate wayside flower of midsummer is meadow beauty, *Rhexia*, with its peculiar funnel-like stamens, and four crimson petals. We may note, too, fine tufts of white meadow rue, groups of yellow, red, and orange lilies, slender blue iris, viburnums, cornels and button-ball.

Few people seem to know how many and varied are our clovers. Besides the fine old familiar dark red one, of forage fame, there is the little running white one, the lovely pink alsike, the Hungarian with its crimson pompon, and the two yellow hop clovers. Then, in dry districts rabbits-foot is common, with calyx teeth silken and feathery. It is a dainty little plant, like most of its kind adventive from Europe. Do not mistake the lucerne medick and alfalfa for clovers, nor yet the melilots white and yellow. They are of close affiliation, but have pinnately compound instead of palmate leaves.

Surely any record of wayside flowers would be incomplete that omitted the wild roses, raspberries and brambles.

“Thy fruit full well the school-boy knows,
Wild bramble of the brake,
Then put thee forth thy small white rose,
I love it for his sake.

Though woodbines flaunt and roses glow
O'er all the fragrant bowers,
Thou needs't not be ashamed to show
Thy satin-threaded flowers.

One can hardly speak of pond-lilies as wayside flowers, and yet, in a sense, they are so. Very refreshing it is to catch glimpses of their white, cool, odorous blossoms, anchored on some shaded pond, their leaves just tipping to the breeze to show their crimson lining. Among them grows yellow spatterdock, handsome in its place but coarse and mal-odorous.

It must be realized that our wayside flora will of necessity vary with locality. Along the sea beaches one will observe sea-lavender, jointed knotweed, rose hibiscus, yellow loosestrife, camphor-weed, maritime goldenrod and sea-side aster. Again, among the mountains will occur wild flowers not seen in the lowlands, mountain chickweed, dwarf azalea, Peck's geum and the like. Geology and geography both take a part in distribution as well as more subtle and accidental agencies.

Brown University, Providence, R. I.

THE PINE BARRENS OF NEW JERSEY.

THOSE who have gained their knowledge of the New Jersey "pine barrens" from a few weeks sojourn at Barnegat, Tom's River or other towns along the coast, supplemented by sundry glimpses from the car window as the train rushes along, may yet have but a faint idea of what the real pine barrens are like. To see them at their best—which in this case is also their worst—one must get further away from civilization than the railway will carry him. But before one leaves it, indications of what is to come are not wanting. The railroad dwindles from four tracks to two and finally one; the stations become smaller and draw further apart; and the vegetation steadily grows more dejected in appearance. At

the last change of cars—nobody can get into the heart of the “pines” without several such changes—one finds a train of two or three cars drawn by a wheezy engine which after some miles of jolting over uneven track finally comes to a standstill as if too tired and discouraged to go further. This is the end of the road and the few houses which constitute the last village are clustered about in a spot whose fertility, although slightly above that of the surrounding country, is still sufficient to make it a veritable oasis in this all but desert land. In all directions from its borders the gray sand extends, tenanted by stunted specimens of pitch pine whose stems are little more than poles, with a brush of yellow-green foliage at top which scarcely shades the small oaks and huckleberry bushes forming the principal underwood.

Upon entering the pines, one is impressed, not only by the paucity of species but also by the small number of individuals. The vegetation in many places is so scattering, that if the smooth level sand were solid, the bicyclist might ride through the woods, choosing his own path, and meet with very few obstructions. With a wagon, one may drive about where he pleases. It is nevertheless the fashion to keep to the beaten path, even when a new one might promise better traveling. Once a road is broken, it is never wholly reclaimed by Nature, although travel on it may subsequently cease. One frequently comes upon such derelicts aimlessly sprawling across the country but apparently leading nowhere. It seems scarcely possible that the passing of an occasional wagon could keep the way open, but it is difficult for the plants to get a foothold in the dry soil, and the wind helps somewhat by blowing the sand about, so that the roadbed soon sinks below the surface, sometimes to the depth of a foot. In the yielding sand at the bottom the tires of the wagons are lost to sight. Three miles an hour is considered rapid traveling over such roads.

As much rain falls upon this part of New Jersey as upon any other, but the thirsty sand rapidly sucks up the moisture

and in a few short hours after a storm, the earth is dry again. These arid conditions have a very noticeable effect upon the few other species that here and there struggle with the pines and oaks for existence. For the most part they are heaths or heath-like plants with thick leathery leaves that are slow to let their scanty supply of moisture go. The wintergreen and trailing arbutus are common as is their near relative the bearberry. This latter is a prostrate shrub with small shining leaves and a profusion of red berries, very attractive to the sight, but containing a juiceless mealy pulp within. Apparently these berries once had juice, but the plant long ago gave up the idea of acquiring enough water in such a place to provide them with it. The cactus is the only green thing in the region that seems absolutely happy even in the driest weather. Its thick stems act as so many reservoirs storing up water during wet weather against a time of need and parting with it very grudgingly in dry times. This is probably the only plant that can produce juicy fruit no matter how dry the season. In June and July the plants are fairly full of the dark red "prickly pears."

It is sometimes difficult to understand how certain species of sand plants are able to exist at all until the underground portions are examined. It is then seen that the top is but an insignificant part of the whole plant, the thick roots often descending straight down for a distance of nearly six feet in their search for water. A notable exception to this is a species of "reindeer moss," a gray wiry lichen which forms little rounded knolls like pincushions on the bare sand. It lies loosely on the earth and appears not to be attached to it at all. At mid-day it is seemingly dead and the stiff branches crunch under foot, but as soon as the dew begins to fall it revives and at once becomes moist, pliant, soft as velvet and full of life.

Desolate and barren as the pines ordinarily appear, the extreme is not reached until one has seen the tract of land

known as "the plains" lying due west from Tuckerton. They are seldom visited save by the berry picker or an occasional traveller taking a short cut to some distant village. If one can imagine a slightly undulating piece of ground, stretching away in all directions to the horizon and covered everywhere with diminutive pines and oaks, which, although not more than knee-high, bear their cones and acorns as plentifully as their more favored kin in better soil, he will have a fair idea of the region. The natives express its sterility by asserting that the only land tortoise ever captured in the locality was inquiring the way to the poor-house. In all this expanse, the tallest tree—a sassafras—is but fifteen feet high. To the botanist this section is of considerable interest since it contains several plants that are rarely found elsewhere. Among these may be mentioned the crow-berry, a low heathy plant which very few botanists have seen growing.

Among the most attractive spots in the barrens are the low places where the water comes to the surface. Here the sand vegetation suddenly gives way to cranberry bogs set thick with sundews, bladderworts and pitcher-plants all busily engaged in trapping insects. Or a greater depression may contain a cedar swamp whose tangled depths are the source of one of the amber-colored streams which leisurely wander away to join one of the numerous small rivers of south Jersey. As one emerges from the plains in the direction of Wading river, these bogs become very numerous, notwithstanding which, it is claimed that there is no malaria there and the natives drink from any running water with impunity.

The mosquito is everywhere in evidence, but by day these are not the greatest of the stinging, biting pests that inhabit the barrens. The crow-flies, black as night and as large as grass-hoppers, and several kinds of horse-flies which apparently consider man much better than a horse, are abundant and dwarf the mosquito's puny efforts into nothingness by com-

parison. When these bite, blood flows from the wound. Horses are rendered fairly frantic by their attacks. At sundown these insects retire from the field, leaving the mosquitos much reinforced, in full possession.

The cranberry bogs are usually thickly fringed with huckleberry bushes. Upon these two crops nearly all who inhabit the barrens depend for an existence. During the few weeks that the berries are ripe everybody is employed and even at the small price obtained for the berries it is not uncommon for a good picker to make ten dollars in a day. While some of the berries are picked by hand and some by means of an instrument not unlike a coarse comb, the greater part are "scooped." The "scoop" is a basket-like affair with the top covered over as far as the handle on one side. The open side is swung against the tops of the bushes by the operator with such skill that few except ripe berries fall into the scoop. The berries are then winnowed by being slowly poured from one basket held a few feet above another while the wind blows through them, carrying away any leaves which have fallen with the berries. Host of the huckleberry pickers live in or near the barrens and daily journey to the best grounds in all sorts of picturesque conveyances. The outsider who visits the region for the huckleberry season may usually be found camping out in the most primitive style near some town along the railroad where he may readily turn his berries over to the agent of the commission man.

Later in the year, the cranberries afford employment, but since they are for the most part cultivated and only a small price is paid for picking, the pickers earn much less. There are, however, many places where the cranberries grow wild and may be had for the picking. The huckleberries are considered free everywhere.

The bogs again afford many plants to interest the botanist. The bog asphodel, an orchid-like plant with a spike of

lemon-yellow flowers is found nowhere else in the whole world and is valued accordingly by the plant collector. It is only occasionally found and seldom in great abundance. The curly grass is another plant worth more than passing notice from the fact that it is the smallest fern in eastern America. A fair sized plant roots and all, may be covered by laying a single finger upon it. Its leaves are like very slender blades of grass, coiled corkscrew-fashion and one must get down on hands and knees to find it. New Jersey is the only state in which it grows. These bogs are regarded as paradises by the botanist and in their season furnish a wealth of orchids and other rare plants not to mention commoner things which attract the plant lover.

If one consults a map of this region, he will find many places marked upon it which fail to materialize when search is made for them. It usually turns out that they are the sites of iron furnaces which were once employed in extracting iron from the bog ores. With the diminution of the ore supply the furnaces were gradually abandoned until all that now remains of many are crumbling walls and decaying timbers about the hollows where dwellings once stood. A few small hamlets have managed to exist after the fires in their furnaces died out, but the greater number are deep in decay, tenanted only by the lizard who delights to bask in the sunlight upon their fallen walls.—*New York Tribune*.

THE GREAT PRIMEVAL FOREST

THE great primeval forest, which is perhaps represented on a more impressive scale than anywhere else in South America, is the same that was described by the brothers Schomburgh in 1848 and 1850. We traveled up the middle course of the Essequibo river for seventy miles without finding a solitary clearing; not a single break in all the forest except where tributary streams flowed into our own. On both banks

of this chocolate-brown stream at a distance of seventy miles from its mouth, where the width of the stream is still from one to two miles or four or five times the normal width of the Mississippi river the great curtain of the primeval forest hangs virtually untouched by man. If I were asked to state briefly the distinguishing characteristics of this forest, I should find it difficult to frame a reply or to give to it proper perspective in comparison with the forest elsewhere. The great South American primeval forest is impressive; is imposing, but at the same time it is forbidding. With the great walls of vegetation rising to a height of 175 and 200 feet, with the crown of the forest carried at this enormous height above the spectators, and with innumerable creepers and trailers binding the whole into an almost impenetrable maze, the eye that is on the exterior has difficulty in finding points of rest or repose. But little sunlight penetrates into the recesses of the interior, and what there is of it comes out in scattered flecks of brilliantly reflected light and not as sunlight areas.

In its botanical relations the forest does not look particularly tropical, if by tropical we mean an aspect of vegetation which is dominated by types that one habitually associates with the lower climes and whose general physiognomy differs from the types of temperate regions. It is true that the eye fails to note the familiar forms of the oak, the maple, beech birch or poplar, but the general contour of tropical foliage, especially where it appears lost in mass, is not very different from that of these trees or of trees that in one form or another make up the bulk of the north woods. Except where clumps of palms stand out in particular relief, the trees of the South American forest have, apart from exceeding luxuriance and magnitude of dimensions, so nearly the characteristics of the foliage of the trees of our own region that the traveler could easily misinterpret the landscape of which they formed a part. Even where palms are present, they generally lose their crowns in the wall of vegetation that rises

above them and no longer appear as dominating or physiognomic types in the landscape; they are hardly more than sporadic components of the vegetation.

It is only when we penetrate into the interior of this great forest, when we study the individual elements that compose it, that we begin to be impressed with distinctive characteristics. One can truly say that almost every tree of the South American primeval forest is a botanical garden of its own. Rising up in supreme magnificence, the trunk hardly sending out a branch before it has attained a height of 125 or 150 feet, and completely overgrown with creeping and climbing plants, aroids and orchids, it is wholly different from the trees of the northern woods as it well can be. The tendency to spreading umbrella-like crowns differentiates the forest components of the south, as do also the giant buttressed roots which distinguish so many of the species.

Alfred Russell Wallace, who has enjoyed unusual advantages for the study of the general characteristics of tropical vegetation, has emphasized as one of the marked features of the tropical forest the absence of flowers. He says, indeed, that one may travel for weeks at a time along the streams of the Amazon region without once realizing those aspects of floral development which, whether by profusion of growth, or by size and color, impress the landscape of temperate regions. This picture does not seem to apply to the forest of the river-banks of the Guianas, and its inaccuracy has been pointed out by that acute student of nature, Mr. Inturn. The streamers of purple, red and white which hang down over the forest curtain easily recall in profusion and wealth of color the flowers of the north—the field daisy, clover, and buttercup. Indeed, it would be difficult to recall in forests of the north, even as rare instances, that display of flowers which so frequently repeats itself here.—*From an article by Prof. Angelo Hielprin in National Geographic Magazine.*

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

VERJUICE.—The civilized palate craves not only food, but various condiments which of themselves have little if any food value. Mixed with the food they give it a certain relish. Some of the well known condiments are pepper and other spices, vanilla, vinegar and red pepper. A condiment much prized in earlier times was called verjuice. This was made by expressing the juice from green apples, crab-apples, unripe grapes and other unripe fruit. Verjuice was intensely sour and used like vinegar or lemon juice is at present. It is said to still be used to a limited extent.

VIOLET HYBRIDS.—Dr. Ezra Brainerd has been growing some of the reputed species of blue violets from seed and the results have shown what all of us have felt morally sure of, namely, that many of the recently named species of blue violets are simply hybrids. Dr. Brainerd says that the seedlings of the pure violet species resemble one another very closely, but the hybrid offspring are not only unlike each other but often unlike their parents. In cases like the latter we would be inclined to inquire whether the reputed pure parent species were not themselves hybrids. At present, the genus *Viola* in the Eastern States is regarded by radical botanists as being composed of a considerable number of closely allied species that freely interbreed, but we ask, why are these radical bot-

exists so cock-sure that these are species, why not sub-species or forms? If we consider them forms they will serve just as well as an attachment for the name of a botanist and that is all any such fine distinctions are good for. When species of violets are split so fine that a violetologist cannot name his own species without looking at the labels it is nearly time to stop.

KNOWING BEANS.—The man who “doesn’t know beans” is considered of not much account, but there is a great deal about this common vegetable that is not familiar to the average individual. We usually speak of beans as if there were but one edible species; in reality there are more than half a dozen commonly cultivated. The kidney bean (*Phaseolus vulgaris*) is the one with which we are most familiar, the common bush bean being of this type. The lima bean (*Phaseolus lunatus*) is also well known, especially in Southern gardens. The scarlet runner bean (*Phaseolus multiflorus*) is seldom used as a garden crop with us, but its bright red flowers and gaily colored pods make it sought to some extent for decorative planting. In Great Britain it is commonly cultivated and is there called runner bean. The root is perennial and may be kept over winter in the cellar. Another British favorite is the broad bean (*Vicia faba*) often called the horse bean and without doubt the species fed to his horse by the immortal Captain Jinks. The seed is not very bean-like and the plant itself looks more like a pea than a bean. It, too, is perennial and loves a cool summer. For this reason, many more are grown in Canada than in the United States. The soy or soja bean (*Glycine hispida*) is the bean of the Japanese. It is becoming common in cultivation in our own country, but as yet only as a food for cattle and hogs. The hyacinth bean (*Dolichos lablab*) is another bean used for decorative purposes that is edible. It produces very long pods and is in consequence called asparagus or yard-long beans. The velvet

or banana bean (*Mucuna utilis*) completes the list of our common beans. This latter is a native of the tropics and is likely to be redistricted to the warmer parts of America. It is used for a forage crop and for plowing under to enrich the soil.

HOREHOUND FOR THE MILLION.—One of the weeds that amount almost to a pest in Southern California is the common horehound (*Marrubium vulgare*) of the old fashioned herb garden. It is abundant wherever the ground is cultivated, and its matured seed-vessels cling by prickles to the wool of animals and to the clothing of pedestrians in the persistent fashion of the begar's ticks and Spanish needles of the East. The average Eastern tourist with interest enough in plants to notice it at all, usually mistakes it for catnip, but curiously enough the latter herb seems never to have become wild here. At least, I have never seen it, nor do the local manuals list it.—*C. F. Saunders, Pasadena, California.*

BUTTER-CUPS AND DAISIES.—It would be hard for residents in some sections of the Eastern States to imagine a region in which the common butter-cup and daisies are rare or unknown but such a condition prevails in the editor's vicinity; indeed, at the present time, a thriving bunch of the plant which in other regions is the despised white weed or ox-eye daisy, is blooming among the other flowers in his garden. Now and then, one may find a tuft of this plant along the railroad like a tramp looking for fresh fields, but the flowers are as yet an absolute novelty to most people who have never made a visit to the east. As to butter-cups, while there are plenty of indigenous species *Ranunculus acris* so common in the east is decidedly a rare plant. In this connection it may be of interest to note that the black-eyed-Susan (*Rudbeckia hirta*) rarely if ever fills up single fields to the exclusion of everything else as it does in the east. Here it occurs scattered among other species that hold it within bounds.

NATURE'S EXACTNESS.—Your observations on Nature's exactness in the *Note and Comment* department of your May issue, reminds me of a little aster-like flower which I have collected on the desert, *Monoptilon bellidiforme*. Each flower-head is composed of perhaps 15 or 20 florets, each of which produces a single seed, and every spring tens of thousands of these little plants come into being, making myriads of seeds thus produced. The marvelous thing about them, however, is that on the upper edge of each of those myriad seed is borne one tiny bristle which drops with the seed. It is a case of degenerate pappus, and the wonder is that nature, busy as she is the world over, never forgets that solitary bristle for each of those little florets away out there among the coyotes and prairie dogs of the Mojave Desert.—C. F. Saunders, Pasadena, Cal.

NOMENCLATURE AGAIN.—It is not botanists, alone, that are bothered with the name-tinkers. In a recent number of *Science*, J. L. Kingsley writes that he has been looking for fixity in zoological names for thirty years and the end seems as far away as ever. We quote from his article as follows: "It is all very well to indulge in these antiquarian researches, these games of taxonomic logomachy, if they be recognized as such, but the players fail to recognize one thing: Names of animals and plants are but means for easy reference; nomenclature is not the end and object of all biological science. This digging up of forgotten screeds means but the relegating of the great masters of the past to a secondary position; this framing of ex post facto laws offers a precedent for the future subject of that intolerable disease once known as "mihi itch" to set aside as lightly the laborious schemes of the sciolists of today. Biologists may apparently be divided into two groups: one contains those who find great enjoyment in re-naming things already well named and who regard names as the object of all science. The other group have something to

tell about animals and plants and they regard names merely as a means of identification of the forms referred to. The question once was, "who reads an American book?" If the present tendency continues it will soon be "who can read an American biological work?"

PENNSYLVANIA WILD FLOWERS.—About the middle of May a party of five crossed the Susquehanna River at Millersburg, Penn., intent on finding as many specimens as possible on which there were open flowers. Our territory covered that part of Perry County between the landing and Mt. Patrick. Directly after landing we discovered our old friend, common blue violet, (*V. cucullata*), and growing near were the white violet, (*V. blanda*), and yellow violet, (*V. pubescens*). Scattered among these was pale corydalis, (*Corydalis glauca*) and not far away cinquefoil, (*Potentilla Canadensis*) celandine, (*Chelidonium majus*) and wild cranesbill. (*Geranium maculatum*). Soon one of our number spied what seemed at a distance to be a white star-like flower but on coming nearer we found it to be dog's tooth violet (*Erythronium Dens-canis*) living within calling distance of its near relative yellow adder's tongue (*E. Americanum*). As none of us had ever before found the former, it was with difficulty that we left the patch in which grew millions of a plant that we had considered quite rare. Separated from this colony by a shallow stream, we discovered smooth lungwort, (*Mertensia Virginica*), wild blue phlox, (*Phlox divaricata*) and Dutchman's breeches (*Dicentra cucullaria*) growing in such profusion that we could but wish that the contributor to the AMERICAN BOTANIST, who lived where Dutchman's breeches would soon be a rare flower, might have enjoyed with us the splendid flowers and luxuriant foliage. Mingled with these we saw sweet cicely, (*Osmorrhiza longistylis*), crow's-foot, (*Dentaria laciniata*) and bitter-cress, (*Cardamine rhomboidea*). On the margin of a near-by field, long-leaved stitch wort, (*Stellaria*

longifolia), rock-cress, (*Arabis lyrata*), hedge mustard, (*Sisymbrium officinale*) and pepper-grass, (*Lepidium Virginicum*) had found an abiding place. We had now almost reached Mt. Patrick, a settlement which from a distance bears a strong resemblance to a Swiss village, and turning homeward by a different path we found spring beauties, (*Claytonia Virginica*) and ground ivy (*Nepeta Glechoma*) while in a neighboring woods were butter-weed (*Senecio vulgaris*) and Jack-in the-pulpit (*Arisaema triphyllum*). A lonely columbine (*Aquilegia Canadensis*) and a bare half-dozen wood anemones (*Anemone nemorosa*), near which in a very sandy soil grew a few horse-tails ended our list and we, having completed our circle, boarded the steamer, feeling that the trip was worth all the fatigue it had caused us.—*Katharine P. Smith, Millersburg, Penn.*

EDIBLE FLOWERS.—The cauliflower and artichoke are by no means the only kinds of flowers that are used as food, though, from an edible point of view, Dr. Johnson was probably right when he said the former was "the finest flower of the garden." Cloves and capers are well known to professors of the culinary art and both consist of flowers, the former being the dried flowers of a pretty myrtaceous plant from the far east while capers come from the shores of the Mediterranean and other temperate climes and are made from the partly opened blossoms of a trailing bramble-like shrub. These are all well known edibles but there are many flowers used for eating in other countries that we only admire for their delicate beauty. The Chinaman, for instance, has a penchant for pork served with a sauce made from various members of the lily family, the flowers being first dried and powdered, while the ginger family, besides the root produces flowers that are much relished by native tribes in the Himalayas. In various parts of India and also in New Zealand the pollen of certain flowers is made into bread, while the little brown man from

Japan likes his chrysanthemum salad, made from the petals of his national flower. In England the taste seems to run to drinks, and just now the children are busy gathering cowslips to make cowslip wine. —*Gardening*.

FASCIATED DANDELIONS.—From Miss Mabel Dimock, Peekamose, N. Y., we have recently received excellent specimens of fasciated dandelions. In these specimens there has apparently been a slip in the machinery of nature with the result of uniting what would ordinarily be two or more flower-heads into one. In some years these freaks are quite common and may be distinguished from the normal flower-heads at some distance by their unusual size. Fasciation has been reported in many other flowers, and De Vries, by cultivation has been able to produce a race of fasciated plants from several including the dandelion. It is interesting to note that the coxcomb (*Celosia cristata*) often found in old fashioned gardens is a fasciated plant that has almost replaced the normal form.

THE FARMER'S MENTAL EQUIPMENT.—It is believed by some dwellers in the city that the farmer lives on a farm because he hasn't brains enough to do anything else. The *Ashland Gazette* sizes the case up differently and says that a successful farmer must know considerable of several sciences. "He must have botany enough to enable him to understand the nature of his crops and how they grow; geology enough to know the different kinds of soil and their properties; entomology enough to know which insects are pests and which are friends; ornithology enough to know which of the birds are injurious and which are helpful; forestry enough to know how to properly reserve, extend and harvest his woodland; and horticulture enough to know how to manage his fruit and vegetable gardens." Ordinarily the farmer does not go in much for botany as such; in fact, he may imagine he has no

botany because he may not have taken this study up in school, yet the successful farmer is one of the best of practical botanists. He may not always understand the fundamentals of every operation requiring botanical knowledge but he knows what to do to produce effects. Long before the scientists ascertained why leguminous plants enriched the land, the farmer was familiar with the fact that clover plowed under added fertility to the soil.

RANGE OF *LYCHNIS ALBA*.—The white evening campion (*Lychnis alba*) is a weed so recently introduced that it failed to be noted in any but the most recent Manuals and the range is given as Ontario and the Middle and Eastern States. It is very evident that it has come to stay, however, for it is steadily increasing its territory. It has been known for some years from Joliet and no doubt may be found in the environs of Chicago. An account of this plant was published in volume I, of this magazine.

POLYEMBRYONY.—When we plant a seed we expect it to produce a single new plant, but instances are not rare, in which the seed contains more than one embryo and then we may get several plants from a single seed. Polyembryony as this condition is called is found in at least a dozen plant families and in thirty or more different species. As is well known, the single embryo found in ordinary seeds is produced by the fertilization of a single cell, the egg-cell, within the embryo-sac of the ovule. The extra embryos found in polyembryony arise in different ways, sometimes from other cells within the embryo sac, at others from cells just outside of it. In the June *Torreya* M. T. Cook records his experience with the seeds of the mango tree (*Mangifer Indica*) in which he found at times no less than eight embryos. The orange (*Citrus aurantium*) was the first plant in which polyembryony was found and it still remains one of the most frequent exhibitors

of this feature. Now that plant breeding is progressing on scientific lines, this polyembryony is likely to cause much bother to the horticulturist because usually only one of these embryos comes from the fertilized egg which results from careful pollination and when several seedlings spring from one seed, he is quite at a loss to know which is the hybrid and which are mere offspring from the plant pollinated.

HONEY GUIDES OF BURNING BUSH.—The burning bush (*Euonymus atropurpureus*) is an attractive object in the autumn woods when its pinkish seed-pods begin to open exposing the red-arilled seeds inside, but the flowers that produce these seed-pods are quite as interesting. They are rather small and dull dark red in color, suggesting at once the specific name of the plant. There are four petals, and the ovary is surrounded by a thick disk, such as may be seen in many maples and other near relatives. The chief interest centers in the stamens with bright yellow anthers which alternate with the corolla and are very noticeable against the back ground of dull red. Soon after the flower expands the anthers fall off leaving the short thick filaments, like little posts, in the flower. Since the filaments are also red, one can tell by a glance at the flower whether it is a fresh one or not and the contrasts in color may serve as an indication to visiting insects.

PEACH AND PLUM LEATHER.—Man has discovered a variety of ways for preserving fruits after their season is over. Some like the apple may be kept fresh by simply storing in cellars, others like the fig and prune are dried, still others like the olive are preserved in brine or, like the cucumber, in vinegar, while others are canned as are pears, cherries and the majority of our fruits. A variation of the drying process applied to peaches and plums consists in drying the crushed pulp of these fruits on a platter in an oven forming a fruit "leather." A few hours soaking makes the leather ready

for use. The Italians and other foreigners often preserve tomatoes, of which they are very fond, in the same way. This process is not far removed from that by which guava and cactus "dulce" is made in the tropics. In this connection the Turkish method of preserving grape juice may be mentioned. The juice is boiled down until it is about as thick as molasses and is then further thickened with starch or flour, and spread out in thin sheets to dry in the sun.

TREES INJURED.—Our chilly and prolonged spring has not seemed to affect our native trees, except the sycamores (*Platanus occidentalis*). All of these that I have seen in this section had their new leaves nipped, apparently by frost, just after they had begun to put them out—when the largest were about two or three inches broad and all that I have seen hereabouts are covered with the dead leaves. They have started a new set of leaves, but the young leaves are now only about as large as the first set was when nipped, presenting a marked contrast to the maples and other trees now in full leaf.—*Elwyn Waller, Morristown, N. J.* [It is just possible that the trees have been attacked by a fungus. In the vicinity of New York, many of the oriental plane trees (*Platanus orientalis*) are killed back each spring by this fungus.—*Ed.*]

THE EARTH STARS.—According to Mr. C. G. Lloyd, who has pretty thoroughly searched this planet for specimens, there are but forty-six marked forms of the curious little earth-stars (*Geaster*) in existence though, as is usual in such matters, one hundred and twenty-seven names have been proposed for them. Mr. Lloyd thinks that seventeen of the forty-six forms are not worthy of specific rank, and what he thinks on this subject is nearly certain to be right for no man has seen more of these plants than he. If those who make "new species" of plants were required to see their plants growing before giving them a name, there would be fewer names to both-

er real students. It may almost be set down as an axiom that the maker of the most "new species" knows least about the plants in the field. One may even become so unacquainted with living plants as to be unable to recognize them. "Let us dry it and then see how it looks" said New England's most distinguished botanist when asked for the name of a plant that was not familiar to him.

SASSAFRAS.—I do not think I have seen it recorded that one seldom finds a sassafras tree 8 or 9 inches in diameter, of which the top has not been broken out by some high wind. The break is, of course, an inducement to rot and the broken top often shows rotten wood, but the original cause of the break appears to be due to inherent brittleness in the wood and not to weakening through rotting.—*Elwyn Waller, Morristown, N. J.*

GROWTH OF PERENNIALS.—Even from its seedling stage, the ordinary perennial is a plant of very deliberate ways. The annuals are the active individuals. They must be up and doing or cold, drouth, insects, other species or the gardener may forever prevent their accomplishing their life work. But the perennials, able to withstand the cold of winter, are in no hurry, apparently counting a firm root-hold in the soil and a small amount of stored food accomplishments enough for one growing season. One can almost tell whether a seedling is an annual or perennial by the rapidity with which it grows. The purslane (*Portulaca oleracea*) is one of the latest of weeds to appear each season, but no one ever saw the "pusley" crop short for lack of growth.

EDITORIAL

According to our custom, no numbers of this magazine will be issued for July and August. The number for September will be issued early so that when our subscribers return from their vacations they will find the first number of the new volume awaiting them. We trust that all our readers will have a pleasant summer and return from their outings with full note-books. We dare not expect that their pocket books will be in the same condition.

* * *

The botanically inclined often have occasion to observe the truth of the old couplet that

“ ’Tis strange what difference there can be
’Twixt tweedledum and tweedledee.”

This is well shown in the mere identification, of plants. Take a plant in hand to a botanist for name and he will identify it, give you its family history and tell you what it is good for and consider your thanks adequate pay for the trouble. But take a plant in your throat to the physician and he will identify it as diphtheria, and charge you well for telling what is good for it, or rather what is good for you by being bad for it. Nobody thinks the physician should work for nothing; he has studied hard in order to identify just such frisky bacteria and other plants that make our anatomy the scene of various colonizations, and his money is well earned when he has aided our bodies to exterminate the would-be colonizers. But the botanist belongs to a different class. Though he studies as long as the physician he usually works for nothing. The great Linnaeus, himself, dubbed botany “the amiable science” and its votaries ever since have been an amiable lot of men and women who have done more work without reward than any

other group of scientists of like attainments anywhere. And the botanists, themselves, are usually so animated by a love of the subject that they do not complain. The contributors to the botanical magazines write without pay, the editors devote their time and talents without thought of compensation and the publishers half expect to find themselves in a financial hole at the end of the year. As a matter of fact, we cannot recall a single botanical magazine now published except THE AMERICAN BOTANIST that is not backed up by some society pledged to make good any deficit and usually called upon each year to do so. Since this magazine is not backed up by a botanical society, we find it necessary to make it pay its own way. We have practically said to it what nature has said to the flowers, namely, if you cannot survive without aid, you must perish. Thus far the magazine has survived and we expect it to go right on surviving, but at this time, when, a large number of subscriptions are due, we would call attention to the fact that an increased subscription list will mean a better, or rather a larger magazine. We see all the botanical magazines published in America, and we know there are none better if judged solely by the amount of information supplied. Of course there are many larger, but the technical articles, which interest only the few, take up much of the space. It is not the easiest thing in the world to find subscribers interested in our particular kind of botany. It requires a pretty thorough knowledge of plants in order to appreciate a great deal of the matter we publish, and the majority of botanizers are, unfortunately for us, interested in little more than the names of plants. It is a satisfaction to know, however, that once a subscriber is secured we rarely lose him and sooner or later he orders a set of the back numbers. So we purpose continuing our endeavor to please our present audience and to urge our friends to help us increase it. We send out bills with this issue to all whose subscriptions expire or have expired and

and carnation may be cited as examples. Nature even points the way in such flowers as the water-lily and lotus, and in less measure in mandrake, magnolia, barberry, and hepatica. All these, it will be noticed are simply saucer-like flowers, possessing no special beauty of form. But when it comes to others, whose first claim to attraction is in the marvellous fashioning of the flower cup, man's barbaric taste in matters of beauty is revealed in all its ugliness. Double morning glories, petunias, bellworts and others are in the botanical sense monstrosities and they are no less monstrosities in any esthetic sense. Half the charm of the daffodil and narcissus lies in the clear cup outlined in the center of the flower. To double such a flower, is to render it worthless, if measured by any standard of beauty, except that of a savage. To really improve a flower, we ought to strengthen and deepen those qualities that give it beauty. To enlarge the parts, to increase the clearness of their coloring, to add to the delicacy of their perfume and the texture of their petals may well be among our aims, but if a mere display of colored petal is sought, why bother with flowers at all when something just as good can be made in half the time by a three-dollar-a-week girl with a few pieces of wire and some colored cloth or paper?

* * *

In the *Plant World* for October is an article by Prof. J. C. Arthur on the delayed germination in the cocklebur (*Xanthium*) in which the author seems to be still in the dark as to the reason why the upper of the two seeds in the bur does not germinate readily under normal conditions. If the editors of the *Plant World* will consult recent numbers of the *Botanical Gazette*, or even read carefully THE AMERICAN BOTANIST, they will find that Mr. William Crocker has discovered that the delay is due to the completeness with which the seed-coat of the upper seed excludes oxygen.

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